In This Issue: The Water Power Bill and Northwest Convention Papers

JOURNAL OF ELECTRICITY

VOL. 41 NO. 6 SAN FRANCISCO, SEPTEMBER 15, 1918 PER COPY, 25 CENTS

Help Us Educate the Public

It is imperative to save every pound of coal that can be applied to War purposes.

Likewise every ounce of metal—iron, steel, copper, brass, lead—for **all** the metals are now precious.

In compliance with this request of the Government we have gone carefully through the catalogues of the

HUGHES General Electric Type Hotpoint

lines of electrically heated appliances, and as a result nearly one-half of the numbers will be withdrawn from manufacture during the continuance of the War.

These items will be available as long as the present stock lasts. After that no more of these items can be furnished until normal production is resumed.

The trade will have due notice as to just what items will be temporarily withdrawn.

This is a patriotic move and we have been guided by the following principles——————

——**to suspend such items as will interfere with the industry as little as possible**
——**to retain those appliances essential to the welfare of the civilian population**
——**to promote the appliances which are the largest coal savers**

Here are three suggestions which have been made by the Government covering the handling of electrically heated appliances and we urge that you observe them carefully in the distribution of such appliances as may be allotted to you during the War.

NEW APPLIANCES
No new appliance should be installed in a home where it is necessary for the power company to install new transformers or add to their present equipment, because such material is now dedicated to war purpose.

NEW RANGES
Whenever a wood burning range or a coal burning range with local coal available, will last until after the war it should not be replaced with a new range of any kind.

OLD APPLIANCES
Appliances already installed should not be withdrawn from use because their careful use effects a distinct saving; they should not be replaced with new appliances so long as the old can be repaired and kept in service.

It is not enough for you and your employes to observe these principles. In addition, you must do everything you can to educate the general public to the importance of this conservation work——————

——**teach your customers to save fuel, food and time by using electricity**
——**but always tempered by the Governmental regulations printed above**

Our publicity department will be glad to cooperate with you in getting up advertising matter for your use along conservation lines.

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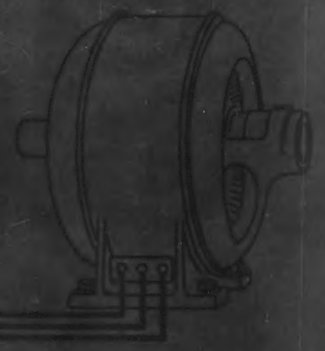

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JOURNAL OF ELECTRICITY

FOUNDED 1887

ROBERT SIBLEY, Editor — CLOTILDE GRUNSKY, Associate

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Fabricated Ship were built, set up, riveted
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THE SPIRIT THAT PREVAILS

These workmen at Raymond, Washington, in thirty-seven hours and fifteen minutes performed recently a piece of national service never before equaled in the history of ship building. Frequently we have called the attention of our readers to the giant steel launchings that have of late heralded the industrial progress of the West to all nations and peoples. But after all it is the small tasks of life, efficiently and well done, that in the aggregate will win the world war for democracy. There is a lesson to be taken home by all of us in viewing this small yet record breaking accomplishment.

A gigantic Liberty Loan, of such proportions that formerly it would be thought to stagger the financial resources of the world, is about to be launched in America. We can far oversubscribe it. Look again at this picture. An aggregate of small tasks such as this, yet well-done, is the spirit that will put the Fourth Liberty Loan over the top. Are we prepared to do our part?

SEP 24 1918

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JOURNAL OF ELECTRICITY

DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

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TYING IN WITH LIBERTY LOAN PUBLICITY—

Never before in its nineteen hundred years of eventful life has the application of the Golden Rule proven to net results to the doer in a more effective manner than in these days of national stress. Let us continue to do for our beloved nation those things we would have done for us as individuals were we in need of help.

The giant Fourth Liberty Loan Campaign is upon us. On another page of this issue helpful suggestions are given as to how window displays can be made to reflect the Liberty Loan Campaign and its activities.

There is no question but that the harmonizing of displays with the giant publicity of the Liberty Loan will add its quota of helpfulness in the carrying out of this great patriotic task—at the same time the reflex action is sure to prove helpful to the doer in return. Let us then tie-in with the Liberty Loan Campaign by carefully worked out window displays and other means of publicity at our command. You will be surprised at the results.

Northwest Electric Light and Power Association

The Northwest Electric Light & Power Association in its evident desire to harmonize with the war service activities of the hour has limited its discussions to four papers, extended extracts from which may be found elsewhere in this issue.

The paper on new business during the war, as presented by R. M. Boykin and George C. Sawyer, touches upon a vital issue in the present utility life of the West. When the customer insists upon extensions of service and it is evident that the service is non-essential there is but one thing to do on the part of the district manager—not to make the extension. That appliance sales may well be pushed during the war is also forcefully brought out. The authors state, however, that the sales should be pushed so as to make legitimate profits and not at the discounts formerly urged. This principle of action is well acted upon in California, where the California Electrical Cooperative Campaign has exploded the fallacy of proceeding on any other basis but a profit-making return even during peace times.

V. G. Shinkle of the Washington Power Company urges in his paper that a more general authority be conferred upon the purchasing agent as he can better fix a general policy for the best interests of the company as a whole. In discussing the question of stores the author advises that large stocks be laid in at present in every possible case in order to avoid the delays and interruptions of the present short order due to national stress.

W. R. Putnam, in his usual thorough manner, has presented a noteworthy contribution on the electric range and the electric water heater. He shows from the results of a questionnaire that the electric heater to be profitable need not invariably be sold with range installations. In fact for the short time that the electric heater has been upon the market, it stands in a very favorable light. But above all emphasis is made upon the necessity of keeping alive electric range sales, as the author states the public is sold on the idea and interest should not be allowed to lag.

J. R. King, in his paper on diversity customer loads, offers timely suggestions on how to make the survey both for the customer's needs and for the supply of power on the part of the power company. He also discusses the question of essentials and priorities of power service due to war conditions—subjects of vital interest to the industry throughout the West.

As the editorial forms of this issue of the Journal of Electricity go to press representatives from the several company members of the association are gathering in Portland for discussion of these timely subjects.

The year has been one fraught with difficulty in the Northwest. The shortage of men and the severe calls for excessive power supply have taxed the limits of the operating companies to the utmost. The close harmony and sympathy that prevail between all of the company members of this magnificent organization has been a constant source of help

and inspiration during the year. To those that have had the directing of the affairs of this splendid organization during the critical year just past must be given a lasting debt of gratitude in the annals of utility life in the Northwest.

Engineering for the Returned Soldier

Some months back many of the commercial and engineering thinkers of the West had a real treat in hearing Secretary Lane of the Department of the Interior speak before an enormous audience at the Commonwealth Club in the Palace Hotel in San Francisco on the subject of providing homes for returned soldiers. At the very hour the address was being given, the advance of the great Teutonic Drive which began on March 21, 1918, was at its most triumphant period. Indeed, the fall of Paris and the capture of the channel ports seemed not an impossibility. In spite of this the words of the Secretary were so humanistic—so appealing and longing for a better world—so hopeful in the ultimate triumph of the cause of democracy—that every one present felt a distinct uplift in going forth to their individual tasks upon the close of the meeting. The Secretary—a product of the West and its traditions—has by his splendid practical and humanitarian ideals won the heart and soul of the West in his effort to secure liberal appropriations for gathering engineering data for his plan for the returned soldier.

The plan presented by Secretary Lane to the President and to Congress calls for a preliminary study of unused lands of the country, with particular reference to the irrigation of some 15,000,000 acres of arid land, the drainage of between 70,000,000 and 80,000,000 acres of swamp land, and the clearing of approximately 200,000,000 acres of cut-over or logged-off land with the purpose in view of reclaiming these lands through Government agency and then providing homes for returned soldiers.

This splendid proposal has in view a two-fold object—it will not only care for the returned soldier making him an independent productive agent for national strength, but the waste lands of the nation will be thereby reclaimed as a joy and lasting benefit to all posterity.

Surely the plan merits the hearty, sympathetic and active support of all well-wishers of the nation.

A New Call for the Electrification of Railroads

The contemplation of the present proportions of America's ship building program leads the thoughtful student into many new and interesting avenues of research. The completion of the 25,000,000 tons of ships for the Emergency Fleet within the next two years naturally will call upon the nation's resources for fuel supply in unprecedented proportions.

J. H. Rosseter, the newly appointed director of operations for the Emergency Fleet ,has recently announced in a public address that some eighty million barrels of fuel oil will be required to operate the fleet. With the present demand upon our fuel oil resources such an additional call as this is readily seen to be impossible.

Hence the only reasonable way to acquire this supply is to make use of the giant water power resources of the nation, seventy per cent of which are situated in the great West. In view of this fact it would seem that the electrification of the railways, at least of the more feasible portions, should be given more earnest consideration.

As pointed out by Director General of Railroads McAdoo, after his recent return to the national capital from the West, the electrification of the roads would mean the elimination of the major burden now imposed on the railroads, that is the tremendous fuel haul. In addition, it would release to other more essential uses the great labor army now engaged in mining and hauling this fuel.

Unquestionably the water power resources of the West, properly developed, could be put to electrification of its transcontinental system of railways and still have sufficient reserve to drive the wheels of industry for an empire.

The Confusion in Tonnage of Ships

The vast ship building program of the nation, calling as it does upon the electrical industry for unprecedented supplies of electrical equipment both in the yards and upon the ships, has injected into the industry terms of measurement familiar to the man of the sea but wholly beyond the comprehension of the man accustomed to the usual electrical terminology.

There are four kinds of tonnage in use in shipping circles—the gross tonnage, net registered tonnage, dead-weight carrying capacity, and displacement. According to the "Pusey & Jones Shipbuilder" referred to by the U.S. Shipping Board in its authorized terminology, the deadweight tonnage is what the vessel actually can carry in tons of heavy cargo, plus stores and bunker coal. Gross tonnage is based on the cubic contents of the hull with certain arbitrary spaces deducted, and has little bearing on the cargo-carrying capacity of the vessel. Net registered tonnage is gross tonnage, with certain allowances for crew space and machinery space deducted, and has little bearing on the dead-weight carrying capacity of the vessel. Displacement is the total weight of the vessel when full of cargo—that is, the weight of her hull plus her dead-weight tonnage.

Referring to the same authority it is stated that in round numbers a ship of 9000 tons dead-weight would stand about as follows:

Dead-weight carrying capacity	9,000
Gross tonnage	5,000
Net registered	3,000
Displacement	12,000

It is well that engineers of the West and men of the electrical industry throughout this vast region acquaint themselves in the most thorough manner with all the more important expressions of the seafaring man as the new era now upon us means a growing relationship with shipping terms never before equaled in the history of the world.

It may be mentioned in passing that the crude and rule-of-thumb methods of measuring cargo offer a splendid opportunity for the standardization committees of the various commercial and engineering bodies of the nation.

The Power Shortage Situation

The shortage of power throughout the West is still being felt to a keener degree with each passing week. In California the situation is especially acute due to the shortage of water in the high Sierras.

Professor Joseph N. Le Conte of the University of California on another page of this issue most interestingly sets forth the present situation from a study of twenty years of snowfall data. The mean curve that he has constructed will enable engineers in a measure to predict conditions next spring and summer after the April peak in the snawfall has been passed.

Meanwhile the state of affairs in California until the winter rains and snow arrive will continue in a state of stress so far as hydroelectric power is concerned. H. G. Butler very tersely summed up the present power status in a recent address before the San Francisco Electrical Development League. In this address he stated that the power demands in Northern and central California could in round numbers be met at the present time by the supply of a total of five million kilowatt hours per day in which two million are being furnished by steam generation in the use of fuel oil, one and one-half million from the stream flow in the mountains, and one and one-half million from the storage of water in the mountains that is still available. This storage supply, it is expected, will be exhausted early in November. In view of this status of affairs the utmost in power economy is necessary. This condition of affairs is largely typical not only in California but throughout the West. It is a condition that demands the highest patriotic sentiments and actions from all citizens. Let us conserve the use of power in every manner reasonably possible that our shipbuilding and our war essentials may not suffer.

A Striking Foreign Opportunity for Electrical Goods

It has long been known how the markets of Chile for electrical ware became opened almost exclusively to German enterprise a score of years ago. A progressive policy of missionary engineering effort followed by ample capital investment and extension of long time credits practically carried away to Germany all the larger electrical export trade of this great republic on the west coast of South America. This capture of Chile's foreign electrical export trade was so complete that even as late as 1915 Germany still sold more electrical goods in Chile than did the United States.

Since that period, however, American enterprise has greatly improved its position but today we are not yet fully prepared to hold on when the war is over.

The Bureau of Foreign and Domestic Commerce at Washington has recently compiled intensely interesting practical information on electrical goods in Bolivia and Chile that will prove very helpful to the trade in getting a clearer conception of this splendid new field of opportunity. The booklet will be furnished the applicant upon payment of a small fee.

Of all the countries on the west coast of South America Chile offers the best opportunity for the immediate sale of electrical goods and the prospects for the future are even brighter. Broad-minded men are planning to build up future commercial relations with our foreign neighbors that will prove mutually helpful in every respect. Now is the time to lay the foundation for this work.

With this splendid new information available, ideals of mutual helpfulness, freed from a spirit of domination, will win this trade permanently for American commerce and yet render a helpfulness to our neighbors that may well be classed as a constructive service in international life. Let us make the very best of this opportunity for service.

The Recapture Clause

The water power situation with its increasing tension so far as new development and utilization of the vast natural resources of the nation is concerned has of late been followed not only with the keenest interest but somewhat with impatience.

In the immediate further opening of power development no one desires to secure an unequal advantage. The main question is to pass at once a law that will make possible a reasonable return on the money invested and also provide for a recapture clause that is fair to the individual and just to the people as a whole should the government desire to recapture the water power site at the expiration of a definite period of time.

On another page of this issue C. E. Grunsky has ably reviewed the present status of the water power bills now before Congress. As stated by this noted authority, in addition to the assurance that the retaking of the property be not made before the expiration of a license term, the licensee is entitled to know that he may enjoy the prospective earnings for a long period of time. He is equally entitled to assurance that the allowed earnings will fully compensate him for making the proposed power development. He will expect a fair return on his investment after allowance for operating expenses, including adequate provision for current depreciation.

All these conditions are fair and reasonable. Surely relief from the present state of inactivity will be granted by Congress in the immediate future.

THE NEW JOURNAL SERVICE: The most comprehensive map yet published will appear in the issue of the Journal of Electricity for October 15, 1918, in which the giant high tension transmission lines of the great West will be shown with all recent information. The issue of October 1, 1918 will feature electricity on the farm and in its many suggestions should prove unusually helpful to the electrical contractor-dealer. Fuller announcements of other helpful articles that are in course of publication will be found in the advertising pages of this issue. In this new and unique series of helpful articles, it is believed that the Journal of Electricity will take another step forward in its splendid new editorial achievements.

UNDEVELOPED WATER POWER IN THE SOUTHWEST

BY F. H. FOWLER

(Power is needed, Congress is making possible the development of our tremendous water resources—and the question of where the possibilities lie throughout the West, is one of the greatest present importance. This survey of the streams of the Southwest adequately covers that region, which although unpromising is still not entirely exhausted. The author is a well known power investigator connected with the U. S. Forest Service. He is at present a Captain in the U. S. Engineers' Reserve Corps.—The Editor.)

Beginning our study of the available water power in the two states with New Mexico,—the farthest from home and the least important in its power sites,—we find that the extreme western edge of the State is drained by three tributaries of the Colorado—San Juan River in the north, Little Colorado in the central portion, and headwaters of the Gila in the south. The drainage in the extreme northeastern corner of the State is eastward into the Canadian and thus through the Red into the Mississippi River. All the rest of the State is drained by the Rio Grande and its principal tributary, the Pecos.

Few Possibilities in New Mexico

Rainfall conditions in New Mexico do not encourage power development. The mean precipitation over a large part of the State being between 10 and 20 inches, only two or three very small areas receive an average of more than 20.

The Rio Grande may be considered the prime source of hydro-electric power for the State, and its use for power purposes is complicated both by extensive use for irrigation and from the fact that it is an international stream, forming the boundary between the United States and Mexico from El Paso southward to the Gulf. Most of the future power developments on the stream and its tributaries will probably be from Albuquerque northward, and will be of the low head type, since the fall per mile at available sites is rarely over 50 ft. The problem of finding suitable foundations for dams will be rather serious, since at several sites that have come under the writer's personal observation the river fill seems to be of considerable depth. On the headwaters of the Pecos, San Juan and Gila there are opportunities for small projects. The drainage from large areas of the State is into sinks, similar to those found in western Nevada, having no natural outlets and presenting few chances of power development.

Conditions More Promising in Arizona

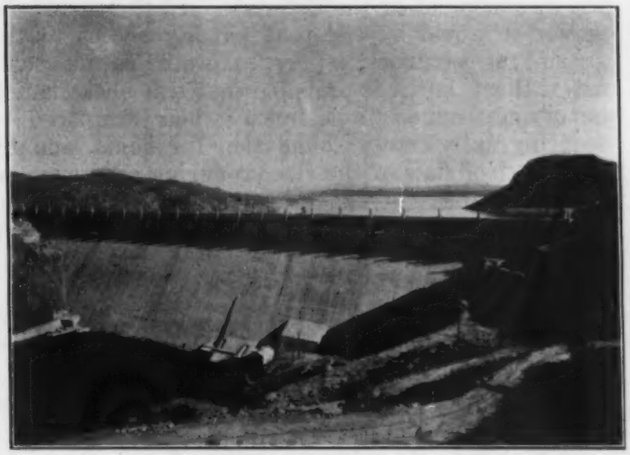
Passing to Arizona we find that conditions are somewhat more promising, but that there are still many difficulties in the way of development.

With the exception of a small area in its southeastern corner the entire State of Arizona is included in the basin of the Great Colorado River system—the Colorado River, itself, forming the most of the northern and all of the western boundary. An idea of the streamflow conditions in the State and resulting power possibilities can be obtained only from a consideration of some of the principal climatological and topographical features. The moisture bearing storms of Arizona are those which drift in from the Pacific and Gulf of California, and pass in a northeasterly direction across the State. In the southwestern part of Arizona there are numerous desert mountain ranges which do not rise to sufficient altitude to present a barrier to these storms, but in the central part of the State, topographic conditions change, and a continuous barrier is presented to the prevailing air currents by the southern scarp of the great Colorado plateau, which extends eastward from the vicinity of Bill Williams Mountain to and across the New Mexico line. The southern face of this scarp is very abrupt but from its rim northward the country slopes away gradually to the brink of the Grand Canyon. The moisture-laden winds from the southeast, in striking this barrier, are deflected upward, cooling and condensation follows, and as a

STORAGE POSSIBILITIES IN THE SOUTHWEST

Grand Falls Power Site—a drop of 200 feet is found in the bed of Little Colorado River here. The stream may within a few hours change from a dry course to one of 8000 or more second feet. With the enormous storage possibilities immediately above, this is one of the most attractive power sites in Arizona.—Photo by W. L. Huber.

result the south rim of the Colorado plateau—or Mogollon Mountains, as they are known locally—receives a more bountiful rainfall than any other portion of the State. By the time the storms have risen high enough to pass the summit they have



THE ELEPHANT BUTTE DAM

One of the two great projects already developed in the Southwest. The Elephant Butte dam, third highest in the world, stores the second largest quantity of water if any storage project in existence—but its water is usel almost wholly for irrigation purposes. The Roosevelt dam, on the other hand, furnishes conisderable power.

lost a large portion of their moisture and the rainfall to the northeast of the rim, in the plateau region, is therefore much less than on the southern scarp.

The Salt and Verde Rivers

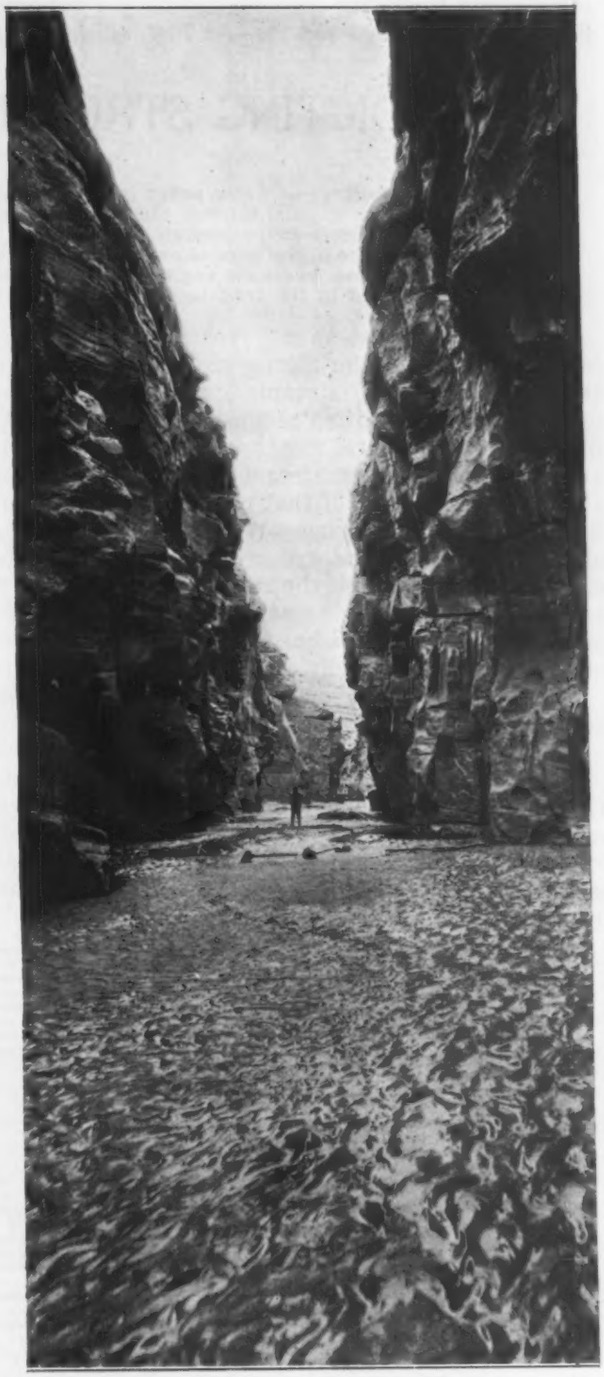
The Verde River and the headwaters of the Salt and Gila, to the southward of the plateau, therefore receive the most bountiful rainfall encountered in the State, although the high country on the headwaters of the Little Colorado also gets a smaller but fairly good supply. Available heads on these various streams are not very attractive, since they have eroded their channels deeply into the sedimentary rocks of the region, except near their extreme headwaters—where of course the tributary drainage area is too small for the installation of power plants. Their upper canyons are, in general, narrow and do not afford good storage sites. On the Verde and Salt Rivers the question of storage is also greatly complicated by the use of water for irrigation on the Salt River project. It is to be hoped that a policy will be adopted by the Water Users' Association (which has recently taken over the project from the U. S. Reclamation Service) that will permit such storage of water above Phoenix as may be necessary for the development of power on the two streams.

Although rainfall conditions on the watershed of the Little Colorado are not, as already noted, so favorable as on the Verde and Salt Rivers, the storage possibilities are somewhat better. One of the most important reservoir sites is at Tolcheco; this has a capacity of 550,000 acre feet. The reservoir is, however, rather shallow and the utilization of the stream will be complicated by very serious silt problems. A promising power site is found a few miles below at Grand Falls. Lower still is the Coconino site.

The Colorado River Itself

The Colorado River is, of course, in a class by itself so far as Arizona power streams are concerned, since it receives its water supply from the melting snows in the mountains of Wyoming, Colorado and eastern Utah, and loses, rather than gains, in discharge while flowing through the desert countries from the Grand Canyon southward.

The best estimates of power available from the portion of the Colorado River between the mouth of Paria River just south of Arizona-Utah state line to Bull's Head rock — 50 miles above Needles — were made by Mr. E. C. LaRue of the U. S. G. S. in his report on "Colorado River and Its Utilization." This shows that in the Marble Canyon extending from the mouth of the Paria River to the mouth of the



THE COCONINO DAM SITE

One of the storage sites on the Little Colorado which offers one of the few possibilities of power development found in the Southwest.—Photo by W. L. Huber.

Little Colorado River, there is an available fall of 450 ft.; in the Upper Grand Canyon between the mouth of the Little Colorado and Kanab Creek, there is an available fall of 600 ft.; in the Lower Grand Canyon between Kanab Creek and the Nevada-Arizona state line, an available fall of 750 ft.; and in Boulder Canyon just below the mouth of the Virgin River, a fall of 110 ft. The present minimum flow at all, save the latter site, is 3500 sec. ft., while at the latter, Boulder Creek site, the small storage above the dam would raise this amount from 3500 to 5000 sec. ft. Studies show that the Colorado may be regulated at a future date to meet irrigation demands, and that with such regulation the minimum flow would be 10,000 sec. ft. At 70% efficiency the present capacity of these various sites is 550,000 horsepower, and the ultimate capacity will be 1,530,000 horsepower.

Difficulties in Development

There are, however, very serious difficulties in the development of the Colorado. To the casual observer it would appear that gaining access to the stream for construction purposes would be the greatest of these, but it is probable that this obstacle will be of only minor importance when compared to securing satisfactory foundation for dams, and by passing flood flow of the stream during construction. The seriousness of the latter may be appreciated when it is noted that the maximum discharge is 150,000 sec. ft.

PREDICTING STREAM FLOW IN THE SIERRAS

BY JOSEPH N. LE CONTE

(The shortage of water power in the present season has led engineers throughout the West to view with unusual interest the records of previous years on snowfall. Here is authoritative data on this timely subject, which sets forth an interesting mean curve for yearly comparison. The author, who is professor of engineering mechanics at the University of California, is an eminent authority on hydraulic engineering. He is the son and namesake of the late great geologist, so beloved in the traditions of the West.—The Editor.)

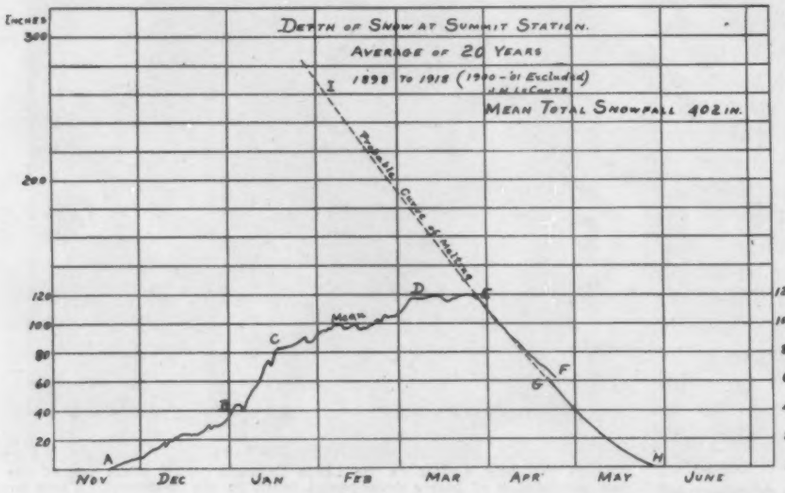
During the past twenty years the writer has been interested in the Sierra snowfall as affecting the summer flow of streams originating in these mountains. It has often seemed possible to predict in a rough way several months in advance the probable condition of the streams in the summer by studying the snowfall of that particular locality during the winter and spring. With the hope of being of service to others the writer has collected the data on snowfall and also on the rate of melting of snow on the ground at a single station in the Sierra for the past twenty years, and has attempted to show the relation between the individual seasons and the average. The results are of course rather unreliable, but enough is brought out to show a definite law.

The station chosen is Summit on the main line of the Southern Pacific Railroad, elevation 7000 feet. This is chosen as being the only point at which a continuous record has been kept for some years past by the U. S. Weather Bureau. The record for total snowfall dates back to the year 1870-71, and is as follows:

RECORD FOR TOTAL ANNUAL SNOWFALL

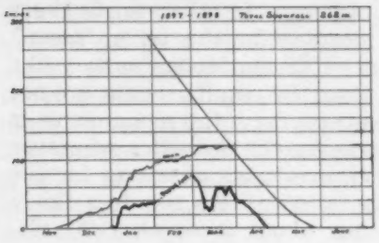
	Inches		Inches
1870-71	300	1895-96	544
1871-72	550	1896-97	560
1872-73	334	1897-98	262
1873-74	200	1898-99	480
1874-75	284	1899-90	406
1875-76	525	1900-01	440
1876-77	178	1901-02	373
1878-79	341	1902-03	407
1878-79	445	1903-04	434
1879-80	783	1904-05	375
1880-81	154	1905-06	514
1881-82	492	1906-07	602
1882-83	299	1907-08	340
1883-84	481	1908-09	442
1884-85	202	1909-10	342
1885-86	462	1910-11	563
1886-87	422	1911-12	277
1887-88	345	1912-13	284
1888-89	261	1913-14	437
1889-90	776	1914-15	362
1890-91	335	1915-16	480
1891-92	380	1916-17	365
1892-93	634	1917-18	290
1893-94	511		
1894-95	685		

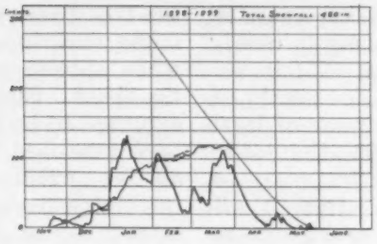
This table apparently is based upon the water precipitation, or melted snow, multiplied by 10, that number being the average ratio of depth of freshly fallen snow to depth of water content. It will be noticed

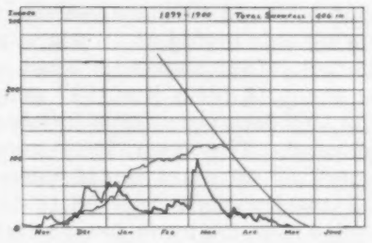


AN EXCELLENT CURVE FOR PREDICTING THE FLOW OF SNOW FED STREAMS IN THE SIERRA NEVADA MOUNTAINS

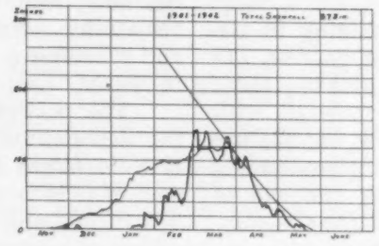
This curve is a mean for twenty years of snowfall. If on the first of April the actual curve falls below the mean, the season will probably be a dry one so far as snow fed streams are concerned. If on the contrary the actual curve of melting falls far above the mean, the snow will lie long in the mountains and floods will come late. This mean curve is shown on the opposite page superimposed on each of the twenty yearly records.

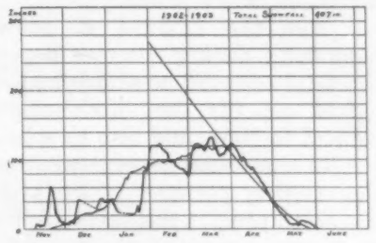


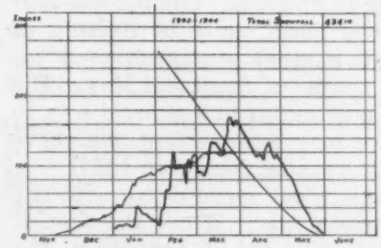


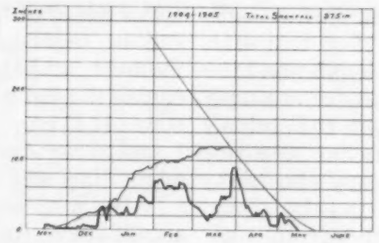


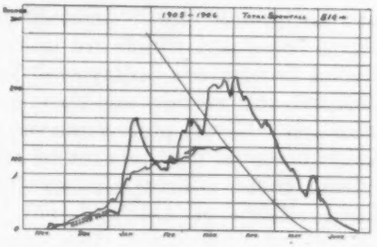
Records for the year 1900 to 1901 are not available. This is, however, the only gap in twenty-one years of records.

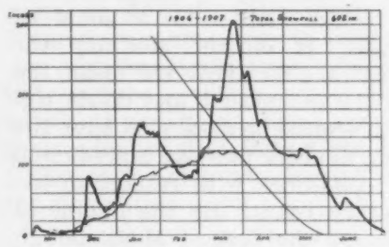


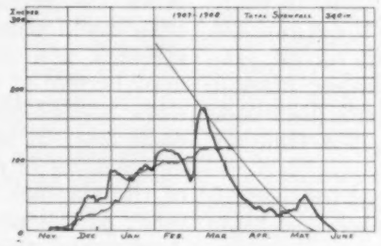


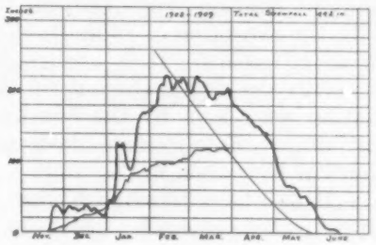


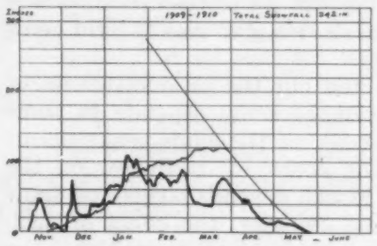


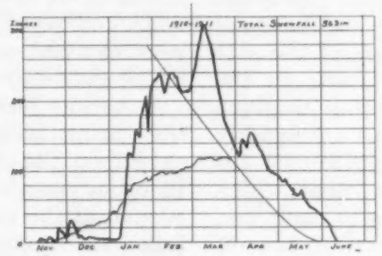


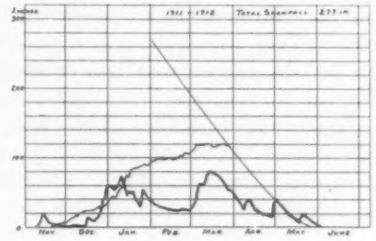


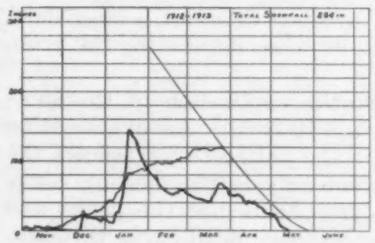


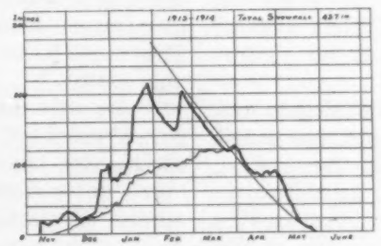


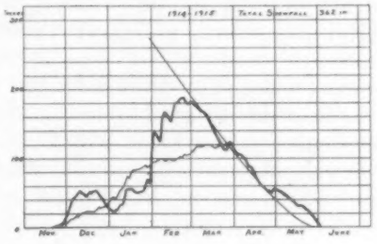


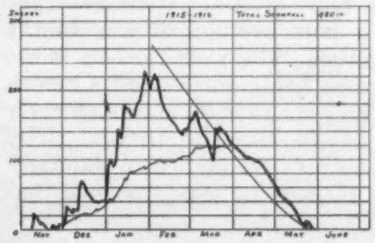


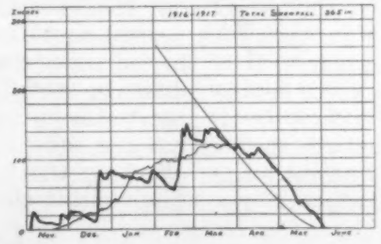


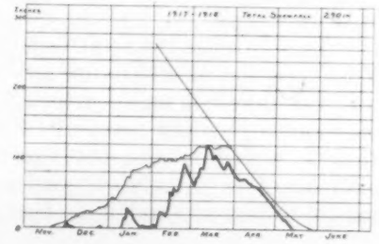












that 1880 and 1890 are years of very heavy snowfall during this period of 48 years, amounting to nearly 63 feet. 1881 shows the least snowfall (154 inches or about 13 feet) but 1877 and 1874 are nearly as low. Of late years 1896 has been the year of least snowfall. The mean total snowfall for the entire period of 48 years is 416 inches, but the mean of the twenty years 1897-98 to 1917-18 (1900-01 excluded as in the mean curve of total snow depth to be discussed later) is 402.

Now the amount of snow remaining in the mountains during summer depends not only on (1) the total snowfall or precipitation, but also to a large extent on, (2) the distribution of snowfall with respect to time, and also to a less extent on, (3) the temperature and general weather conditions during the melting period. If we attempt at the end of spring to predict the state of the snow for the coming summer months, the third factor must of necessity be ignored, as it depends on events which are yet to come and which are unknown. The first and second factors are pretty well known by the middle of April, and we may use them as a basis for a rough forecast. If we plot a curve showing the actual depth of snow on the ground for each day, the resulting curve will in a general way show the combined effects of (1) and (2). The twenty plots shown are a record of the snow on the ground at Summit Station from 1897-98 to the present year, with the exception of 1900-01, of which there appears to be no record. It is understood that record previous to the establishment of the Weather Bureau station were kept by the Southern Pacific Railroad, but unfortunately were destroyed at the time of the San Francisco fire of 1906.

It will be noticed that each of these consists of an extremely irregular curve up to March, the high peaks of course, representing storms. Between storms the curve drops sharply, due to the combined effect of melting and consolidation of the soft mass. In no case will the depth of snow on the ground correspond with the total snowfall as given in the previous table. The ratio 10 to 1 for freshly fallen snow reduced to 3 to 1 or even 2½ to 1 for snow near the ground in the late spring. Snow which falls early in the winter has more time to pack, and a foot of such snow is more productive of run off in the summer months than a foot falling in March. After the month of March there is a fairly smooth curve of melting, for the reason that no violent storms occur after that date.

In order to get the curve of average depth, and particularly the mean curve of melting, we must average the twenty curves shown. If these were continuous curves this would present no difficulty, as we would merely have to average the ordinates for each date, but as negative ordinates are impossible we cannot average the twenty after the lowest one (in this case 1897-98) reaches zero on April 23. If we average abscissae on the melting curve, that is to say take the mean dates at which given depths are reached, we get a smooth consistent curve down to zero, but it is also obvious that the average of abscissae does not give the same result as the average of ordinates, and it is the latter which shows the true time-rate of melting. In other words there is no mathematical meaning to the term "mean" when applied to a set of discontinuous curves like the above. However, since the results sought are not expected to be of great accuracy, the mean curve is here developed by averaging the ordinates wherever all these exist, and then averaging abscissae for the remaining parts. This process gives rise to a fairly smooth curve, beginning about November 20, rising most rapidly during the first half of January, remaining almost constant throughout February, and reaching a well defined maximum of 120 inches in March.

The portion that we are most interested in is the descending part of E H (Fig. 1). The portion E F is found from the average depths, and the part of G H from the average of dates. While there is a discrepancy at G F, the curve is on the whole remarkably smooth, and may be considered as the mean curve of melting at Summit. The portion E H can be regarded as the mean curve of melting at Summit, and this part, it must be remembered, includes the light snow storms of April and May. The curve H E may now be extended in a general way to I and after April 1 we may assume that the curve of melting will roughly parallel the curve I E H.

We may now compare our mean curve with the actual curve for any given year. If one the first of April the actual curve falls below the mean, the season will probably be a dry one so far as snow-fed streams are concerned. If on the contrary the actual curve of melting falls far above the mean, the snow will lie long in the mountains, and floods will come late. It is not of course necessary to have the entire curve of melting in order to make a prediction of the summer snow conditions with respect to the mean of the past twenty years. By the middle of April, or at the latest by the first of May, enough of the curve of melting can be plotted to show the general trend, and late storms give rise to light snow which goes off rapidly.

As has been pointed out the productiveness of the spring accumulation of snow depends to some extent on the date at which the high peaks occur. In other words, if the depth of the snow on the ground at the end of March depends largely on snow fallen in December and January, the effect of such snow in producing run off will be greater than if the same depth were due to snow fallen at a later date. This must be kept in mind when estimating the probable result.

As an example of the application of the snow curve, consider the year 1902-03. An examination of the plot shows that the entire curve follows the mean quite closely. Not only is the melting curve almost identical with the mean, but the peaks and depressions average across the mean curve throughout the season. We may consider this year the nearest approach to a true average of any in the period under consideration. The year 1897-98 is the driest on record, the snow being entirely off a month before the normal. The year 1898-99 shows an early melting curve also, but the effect of this is partly offset by the high peak of 132 inches in January. The melting curve of 1901-02 is nearly normal, but

the fall in the earlier months is poor, so that this year is not up to the average. The year 1905-06 is one of very heavy snow fall. The melting curve is about five weeks later than the normal. Furthermore the high peak in January together with the long continued peak in March, makes this one of the best years for run off on record. 1906-07 has a remarkable peak of 306 inches occurring late in March and shows a melting curve over six weeks late. 1910-11 shows an equally high peak, but due to the fact that it occurs earlier, and is followed by a period of exceptionally rapid melting, the snow mass is not so productive of run off in the summer months. The present season 1917-18 shows a melting curve not far below the normal, but the difficulty in this case is due to the bad distribution in the earlier months. Practically no snow fell till the first of February, and at no time did the peaks rise to the mean curve.

NEW BUSINESS AND THE WAR

BY R. M. BOYKIN AND GEO. C. SAWYER

(What is to be done with the customer who demands service, in the light of the government stand against non-essential expenditures? What lines of business may legitimately be pushed? The answers to these problems as worked out by the utility companies of the Northwest are presented in this paper by the general manager of the North Coast Power Company and the district manager of the Pacific Power & Light Company at North Yakima. The extracts are from a paper presented before the Northwest Electric Light & Power Association.—The Editor.)

The Two Classes of Business

We have only room in this country today for one class of individuals, who have one aim and one ambition, the successful conclusion of the war, but we two classes of business, the essential and non-essential.

To distinguish the two classes of business, Congress on April 5, 1918, created the Capital Issues Committee, whose duty is to assist in the conservation of financial resources, labor and material, so that they may be available for use essential to the prosecution of the war. The Committee does not pass upon issues of $100,000 or less unless a district committee for special reasons shall recommend action by the Committee.

"In all cases, except for war work, explicit reasons must be given why the proposed issue cannot be postponed until after the war, or why the necessity of the issue is greater than the paramount needs of the National Government to conserve the financial resources, materials and labor of the country for the prosecution of the war."

Where Money Should Not Be Spent

The Capital Issues Committee in its regulations has the following to say, that has a direct bearing upon this topic:

"There are certain classes of municipal improvements and expenditures which should wholly cease, such as parks and betterments solely designed for purposes of appearance or architecture. All others should be curtailed and postponed until after the war whenever possible. This applies to public buildings, hospitals, street and road constructions, water works extensions, sewerage and drainage improvement, sidewalks, etc. Ordinarily, only a small proportion of the improvements planned by a municipality are of such a character that they cannot be postponed for a period without endangering the health or welfare of the community." In other words, "The amount of capital invested in municipal bonds every year is very large and if this amount or a substantial portion of this, could be saved, the funds of investors and savings banks would be available in corresponding amounts for the use of the National Government."

Small Expenditures

It has been seen that our Government has wisely taken in hand the issues of securities and the borrowing of funds for capital expenditures in excess of $100,000, but only in a small degree is it attempting to regulate small expenditures. In many cases it is not difficult to differentiate between the essential and non-essential, and executive officers should be their own capital issues committee, as the principles laid down by this committee can be adopted by officers contemplating expenditures.

Should it for some reason become advisable to make a capital expenditure that would be classed as non-essential, it should be remembered that money is no longer cheap and that there are many high-class investments far superior to public utility securities, yielding as a rule better return with less risk.

General Prosperity

The cost of living is high, but wages are also, and it is, of course, a fact that when people are making money they are very willing to spend it regardless of high prices. Because of this condition many people now desire service from the utilities who in former times could not be approached successfully. The impossibility, however, of securing money for extension work is manifest, and if it were available it would be questionable whether or not a utility would be justified in making any considerable extensions at the present prices of material and labor.

It is not, of course, always possible for the central station to refuse service to a prospective customer. In many instances the customer demands service regardless of the cost to himself. Some companies feel that they can afford to run extensions not involving large amounts of money where the ratio of return is comparatively high, say 100%, or greater, and they at the present time employ the plan of asking the customer to pay the company a bonus covering all expense over the amount the company can spend on the above basis. The number of customers who avail themselves of such a plan is really rather surprising. Other companies practice the plan of having the customer pay for the entire extension, allowing the customer's bills to apply on the extension until the entire first cost has been refunded, at which time it becomes the property of the company, and the customer thereafter pays his bills in the

regular way. Even in the latter case discretion must be exercised as to the amount of extension the company would permit for a given amount of business, as under this plan the company must eventually pay for the extension, and unless the revenue is adequate it will continue to be poor business.

Relations with Customers

We believe that it has been found, generally, that prospective customers are quite reasonable when service is refused, providing the situation is properly presented to them. Combination gas and electric companies are frequently placed in embarrassing positions by reason of requests for electric service for cooking and like purposes in residences where gas service is already installed and available. It is necessary for these companies to protect the investment represented by their gas plants and distribution systems and they have, therefore, a considerable problem when cases like that above mentioned arise.

Present conditions offer to such companies an excellent opportunity for refusing to install electric service in these instances and at the same time secure revenue for their companies by the sale of gas. Specific cases have come to our attention where people owning an electric range move to a town covered by a combination company and located in homes equipped for rendering gas service. Having been satisfied with the operation of their electric ranges they requested electric service from the combination company. The granting of their request would have made necessary the installation of transformers, and in one or two cases a span of two primaries. The company refused to make the investment on the ground that cooking service was already available in the homes in question and that it considered duplication, particularly during the duration of the war, an unnecessary and unpatriotic expense. It so happened that the customers in question had secured their ranges on such a basis that they were able to dispose of them without great loss, and when the proposition was explained to them they evinced a willingness to use the gas service at least for the present.

In these particular cases the company in question saved an expenditure of several hundred dollars at a time when money is greatly needed, and at the same time secured the business of the consumer for their gas plant, in which the investment to serve the customer's home had, as above stated, already been made, and the only expense connected with rendering the service was the installation of the gas meter.

Where Expansion is Possible

It is not possible, however, for the utility to sit back and do nothing at a time when operating costs are increasing rapidly and the volume of business is perhaps remaining somewhat constant because of the inability to make extensions and take on new business. Some way must be found of increasing the company's revenue without adding to the company's investment materially.

Some new business can, of course, be secured at small expense, such as business and residences desiring service that are located directly on existing lines, and these can, of course, be taken care of in the majority of cases. It is sometimes found, however, that the expense of serving a customer is so great when transformer equipment, meter and transformer service is considered that it is not profitable business.

Appliance Sales

The other main line of activity should be appliance sales. The sale of appliances accomplishes two important things. It maintains the new business department of an organization because it offers to the salesmen an opportunity to earn their salary on the sale of appliances and installing of additional outlets in the home alone, and it swells the company's revenue in kilowatt hour sales. Never at any time in the history of the electric utilities has the opportunity for the sale of electric appliances been as propitious as it is today. The labor problem in the home has become so serious that the average housewife finds it incumbent upon her to perform many household duties that heretofore have been done by servants, and she is interested in being enabled to perform these duties with as little expenditure of time and effort as possible.

Electric appliances solve the problem for her in a very satisfactory manner and the results which electric utilities accomplish in the appliance line will be limited only by the effort that is put forth and by the educational work which is done by them in connection with the use of the appliances. The outlet campaign inaugurated by The Society for Electrical Development is a splendid plan and is in keeping with the idea of increasing the company's earnings through existing customers. It works in well with appliance campaigns, and by combining the two the utilities should be able to accomplish results warranting their retaining their new business staff and adding to their merchandise and kilowatt hour sales.

No Cut Rate Sales

This is the time when utilities which have heretofore favored the selling of appliances at less than list prices should by all means discontinue the practice. It is possible that this method of merchandising by central stations was at one time justified during the development of the various appliances when it was thought necessary to aid their introduction by quoting as low a price as was possible. This condition no longer exists in the same sense that it did years ago and the utility which persists in the practice is simply reducing its merchandising profits and is tending to demoralize the appliance market in its town.

We need all of the merchandise profit that we are legitimately entitled to and it is a fact that people expect to pay the going market price for all goods which they purchase. It may be claimed that cut price sales and campaign sales have been very successful, and the writers of this paper agree that this is apparently true. They believe, however, that had the same amount of effort been expended in advertising, solicitation, demonstration, etc., on standard appliances at regular list prices it is entirely probable that practically as many appliances would have been sold, and it is assured that the profit to the central stations would have been greatly increased.

STORES AND PURCHASING PROBLEMS

BY V. G. SHINKLE

(A discussion of the problems of the war from the standpoint of the purchasing agent. Why stocks must be abnormally large—and the relative unimportance of turnover figures. Relations within the company—and with the salesman. A practical up-to-the-minute analysis of the situation as presented in extracts from a paper read before the Sept. 13th Convention of the Northwest Electric Light & Power Association. The author is connected with the Washington Water Power Company.—The Editor.)

Importance of Purchasing Department—

With the single exception of that of the executive officers, the purchasing agent of a central station comes in the most intimate touch with all departments of the company, for it is obvious that in order to successfully procure and distribute supplies, he must be acutely familiar with the workings of all departments and must be able to always maintain good relationships with all of them. Unfortunately for the purchasing agent, as an individual, and unfortunately for the company, in a business sense, everybody connected with the organization seems to feel fully qualified to do the buying and department heads are too prone to dictate to the buyer what firms he shall patronize. It is often necessary to have conferences between factory representatives and the engineers of the company, but these councils should be handled by the purchasing agent and contracts should ultimately be closed by him. He should never deteriorate into an order clerk who merely signs his name on the dotted line, but should always be alert to the possibilities of his position. For the last few years we have heard everything of salesmanship and little of buying, and yet you should consider how much more might be lost by a poor buy than might be gained by a good sale, for the poor purchase might be on a lot of material which is capitalized and the loss may be reflected in the companies' earnings for years to come.

The Necessary Records—

The work of the purchasing department is very intensive, requiring rapidity as well as accuracy, and the whole foundation would crumble were records not always in first class condition.

The records should have the following:

1—All catalogues and discount sheets properly indexed and filed.
2—An absolutely accurate record of every order placed.
3—Authority in writing for every order placed.
4—A numerical record of every order placed.
5—A copy of order filed by firm name.
6—A record of the order by shipping date.
7—An adequate price record.
8—Receiving sheets showing receipt of all materials.
9—Delivery sheets showing delivery of all material and signature for same.
10—Requisitions for all material delivered.
11—Proper records of freight and express received and forwarded.
12—Proper stock ledgers or stock cards.

On stocks absolutely under control of the storekeeper the stock cards in normal times prevent overloading and understocking. When deliveries are reasonable there is no excuse for stock items to move by express, and such movement is a severe indictment. An accurate record of stock receipts and movement enables the buyer to learn if he pays too much for outside storage, if warehouse space is inadequate, it enables him to figure his interest charge and insurance expense, for all items must be considered in placing orders. The purchasing agent must be a company man—not a department man.

Stock Turnovers in War Time—

Stock turnover is a most important item and during times of peace should receive paramount attention, but in these strenuous times the turnover cannot be considered as formerly. The regular stock items should be turned over several times a year, but the entire stock will never show as large a relative turnover as in merchandising for many items, such as special street railway work, large transformers, etc., are frequently carried for emergency use and the movement is not at all controlled by the storekeeper, who is in reality but the custodian for this class of material. Naturally, the smaller the turnover of this kind of material, the better for the company. Another handicap in quick turnovers is occasioned by vast quantities of materials being credited to stock from dismantled lines, which will entirely disrupt the most careful previous estimates of the buyers. At all times he should keep in close touch with the construction department to obviate as far as possible overstocking from this source, but it is not always possible to anticipate these heavy "turn ins" of copper wire, insulators, etc. While a quick turnover gives the purchasing agent a very satisfactory "paper record," it is ofttimes a delusion—for by buying a larger stock he may buy more advantageously than by buying from hand to mouth, and save several times the interest and other charges which accrue until this overstock is reduced to normal. No class of business can carry as small a stock as previous to the war. The big mail order houses probably in the past have made as quick turnovers as any line of business. One of these large branch houses formerly figured on a turnover every sixty days, whereas now the stock is disposed of but twice a year, and moreover, the stock in money value is considerably larger than formerly. It is more essential for stocks of concerns producing electricity to be maintained than merchandise stocks, for on account of shortage the merchant loses but a single profit whereas concerns such as ours would lose the continued revenue from the current consumption, or might even be unable to continue maintaining their standard of service. The stations in the northwest must now carry particularly large stocks for added to the abnormal conditions at the factories, we have to contend with very uncertain freight deliveries, as practically all our supply markets are several thousand miles away. An analysis of reports from several Northwest companies indicates an increase in stock (in volume) of from 40 per cent to 60 per cent; percentage increase in stock (in value) of from 40 per cent to 60 per cent.

It is often necessary to change specifications

which have been standard for years in order to get any satisfactory delivery, as so much material is commandeered by the Government, and often it is now necessary to accept delivery as less than carload shipments intended to be carload lots, thus causing very heavy extra transportation charges, but as one purchasing agent writes, "Under normal conditions we might look upon the experiences through which we are passing with regard to locating and getting materials, in a very different light, but under the conditions at the present time, are happy to place our own requirements secondary, in a sense, in order to allow the Government to speed up in every way possible in its war program."

Within certain limitations it is well to let the purchasing agent decide what maximum and what minimum stocks of standard material should be carried, for without this authority he cannot buy to best advantage. This is a strong reason why the purchasing agent should also be storekeeper or have jurisdiction of the stock keeping.

Disposal of Junk—

The storekeeper disposes of all obsolete material and junk, and this is an important duty. In many of the larger companies it is a department of itself. Many thousands of dollars have been made recently on account of disposing of scrap metals, cleaning up all yards and taking advantage of the present high price of the metal market.

There are but few instances when it does not pay to take advantage of the cash discount if the consignor is responsible. On small items, it always pays for these items are not apt to affect bank balances, and if this is the case, the amount saved by taking the discount is a net saving. It is simple mathematics to figure on the larger items, and this should be handled in conjunction with the treasurer of the company. Even the ½ per cent 10-day discount on copper wire figures a net saving considerably better than the usual loan interest rate.

Industrial Interdependence—

Many social conditions will be changed on account of the war, and buyers are even now adjusting themselves to the new conditions. A position of independence or "isolation" as to other buyers' interests has been the attitude in the past, the buyer in the future will recognize industrial interdependence based on the greatest good to the greatest number. Carload specifications will not qualify a minimum carload, except in rare cases; maximum loads will ultimately bring better service to the consignee. Now that material is one of the largest expense factors, we are endeavoring to conserve more than ever before this precious commodity; trying to extend the usefulness of present installation, and this thrift habit will not be readily discontinued. The frequent conferences in regard to plans to reduce to a minimum the ordering of new material bring the various departments closer than ever before to the viewpoint of the buyer, and this also will be permanent. The urgent need of all material to be received in first class condition from the carriers (for now replacement shipments are not readily obtained) has caused the consignor to use proper care in packing shipments, something which has been much neglected in the past. But the real big permanent gain will be the new system of charging for material; prices will be based on cost price and not on what the market will bear. Some conscientious sellers have long priced on this basis, but they have been few.

Relations with Seller's Agents—

If as stated above, the purchasing agent must be able to maintain harmonious relations with the various department heads of his own company, it is just as vital that his relations be congenial with sellers' agents with whom he deals. The day has passed when the buyer who is occasionally seen with the seller is looked upon askance. It is recognized that many of the best buys are partially handled outside the office. While the buyer of a large concern cannot and should not burden himself with small details of price, he should always know considerable about the material he is buying, the conditions of its manufacture and where the product originates. And where can he get this information better than from the salesman, unless the buyer is fortunate enough to be situated near the producing markets and can investigate for himself? The buyer for a large central station is "a jack of all trades" and can be a perfect master of none. His purchases run from Alpha to Omega, and there is scarcely an article he does not at some time purchase. It follows that on all he cannot be as well versed as the man, for instance, who simply sells groceries or the salesman who simply sells rail or the one who handles cement, and nothing else, and it is for this reason that the purchasing agent of a large concern must be surrounded by a class of business friends who will give him correct information, tips on the market and on whose reliability he can absolutely depend, and yet the general knowledge of the purchasing agent becomes broad. Of course many of these "tips" are truly confidential, and it should be recalled that the buyer receives a large portion of his salary for "keeping his mouth shut."

Fundamental Principles—

Just a few generalities in closing:

a. See that the article is properly described on the original order; this saves much useless correspondence.

b. Whenever practical, purchase in the home markets. This creates a public sentiment which is invaluable.

c. The buyer's door should always be open. Some time may thus be wasted but frequently little hints are dropped where one least expects to get valuable information.

d. Never fail to examine all advertising matter received. Every buyer is burdened with an immense amount of advertising matter, mimeograph letters, printed circulars and imitation typewritten letters. Probably ninety-five per cent of this matter is valueless, yet it should all be glanced over, for, as in the case of the itinerant salesman, occasionally a good idea is found in this literature.

e. Remember, "competition is the life of trade" and do not get in the habit of always placing repeat orders just because a certain supplier has "made good in the past." Some other reliable firm is awaiting a chance to show what it can do. But do not burden selling agents with furnishing a quotation on each trifling item you buy. This makes needless work for both buyer and seller and does not result in lower prices.

Above all, remember that misrepresentation or tricky methods are as reprehensible on the part of the buyer as the seller. Service is as much a factor as material in buying and continued service can only be maintained by handling the business in a manner satisfactory to both buyer and seller.

THE ELECTRIC RANGE IN WAR TIME

REPORT OF RANGE COMMITTEE—W. R. PUTNAM, CHAIRMAN

(With the public to a large extent already "sold" on the idea of electric ranges, the central station must determine its war time policy without too greatly impairing this good feeling. A consideration of the costs and returns which must determine western policies is here comprehensively presented by the electric range committee of the Northwest Electric Light and Power Association for the convention of September 13th. Installation data and merchandising practices will be considered in a later issue.—The Editor.)

Changes Due to War Conditions

In preparing the Electric Range Report for this year, your Committee have been confronted with very changed conditions. For the past five years central stations have been urged to take an active interest in development of the electric range business. During the past year the majority of the central stations which had concluded that the electric range business was very desirable, have been compelled for various reasons to cease their range activities. Your committee have considered the causes for this and furthermore have investigated to some extent the justification of such action, particularly in view of the present very considerable demand on the part of customers for electric range service.

In studying this subject at this time we should take into consideration the very important fact that the use of the electric range by the housewife accomplishes three very essential war requirements, viz:

CONSERVATION OF FUEL
CONSERVATION OF FOOD
CONSERVATION OF LABOR

We need not dwell upon the advisability of the central station doing everything in its power to assist the housewife in utilizing labor saving devices in the home, so as to enable her to have additional time for the various war activities in which she takes such a prominent part.

Another phase of this problem is the general tendency for women servants to leave the homes and take up the work of chauffeurs, elevator attendants, barbers, clerks, messengers, etc., with the result that the American housewives who formerly have been accustomed to using servants will be more and more forced to do their own housework.

The Elements Which Determine Range Policy

In the committee's study of this situation, we have gathered information from various central stations for the purpose of determining what effect the following items have had upon change in range policy:

A. Increased cost of line construction.
B. Increased cost of ranges and water heaters.
C. Shortage of power.
D. Money shortage.
E. Decrease in other types of load.
F. Advisability of increasing earnings from residence districts.
G. Hydroelectric generation vs. steam generation.
H. Attitude of consumers.

The replies received show that with few exceptions all of the companies answering have greatly curtailed, if not entirely stopped, range sales work. Among the reasons given are shortage of power, increased cost of line construction, increased cost and difficulty in securing ranges, but the underlying reason given in each reply is the necessity of curtailing expenses in general to meet war conditions.

Other contributing causes are the cost and scarcity of transformers, the difficulty of retaining competent range salesmen at reasonable salaries, the high cost of ranges, the necessity of financing from earnings all ordinary additions to property and the feeling that money spent for new business should be devoted to securing load which will give the greatest return on the money invested.

Keeping the Interest Alive Through Advertising

It is pleasing to note that although little effort is being made to actively push range sales none of the companies reporting have entirely ceased selling ranges, although all have stopped making expensive line extensions and in most instances no line construction, other than the hanging of transformers and running of service drops, is done.

Your committee feels that too much time, effort and money has been expended in promotion and sales work to warrant the entire abandonment of range sales. Several companies which have practically ceased all effort toward range sales have realized the necessity of retaining interest in electric cooking and a number of ingenious plans have been followed to keep this interest alive until conditions again warrant active range campaigns. One company reports that due to war conditions the electric cooking idea has taken on the aspect of a general educational campaign, preparing the people in a steady, persistent way for an electric range campaign which will be arranged when conditions become normal again. This company inaugurated a recipe service to 2000 prospects. This recipe service is not meant to sell ranges now; it is just preparing the prospects for the future on the theory that the inherent value of advertising is cumulative and must go on persistently. After having mailed twenty recipes return post cards were sent asking if prospect wished the recipe service continued and 500 requests for continuance were received. These 500 have developed from possibilities into real prospects. Each recipe sent out carries a few remarks on how electric cooking will improve the particular recipe. No range salesmen are employed but many prospects have been sufficiently interested to call at the Cooking Bureau and ranges are sold where no extensions of lines are necessary. Where extensions of lines are necessary the prospect is advised that war conditions prevent expenditures of this character and their interest in the electric cooking is not allowed to wane.

The Public Asking for Ranges

All companies reporting state that range sales are being made, even when no range salesmen are employed, indicating that ranges already installed are doing salesmen's work. A number of companies state that were conditions normal their range sales for

this year would easily be 50% greater than for 1917. A few companies report that they are making a special effort to sell ranges where little or no extension investment is necessary as a war measure for the conservation of fuel.

One company is now making an exhaustive study of its residential distributing system and is preparing plans for the reconstruction of its residence feeder system with the view of being able to adequately take care of 5000 ranges within the next four years.

Your committee wishes particularly to point out the danger of losing the effect of past promotion and sales work by neglecting to care for existing fuel consumers and by failing to keep the slogan "Cook by Wire" before the public even though range seles effort is at the minimum.

Why Ranges Are Not Being Pushed

Summarizing answers received results in rating the reason for decreased range activity in the following order:

1. Lack of capital on part of central station to finance extensions and deferred payment sales of ranges to customers.
2. Fear on part of management that customers will not purchase high priced ranges.
3. Reduction of central station organizations to purely operating basis and consequently lack of help to handle sales and small extension work.
4. Demand for all available electric power for war industries.

Policies of Installation Charge

The persistent demand on the part of many customers for range service requires action upon the part of the central stations. Some companies are asking the customer to advance the entire cost of the extension, others that portion of the cost of the extention which is in excess of the estimated annual earnings from the range service. One company, which has a considerable stock of ranges on hand, will spend for range extension a sum equal to the estimated annual earnings from range service, plus the initial cash payment of customer on any electric range in stock, providing total cost of extension does not exceed $90.00 per range.

Actual Costs of Installation

There is a very mistaken idea as to the cost of electric range service where attention is devoted to securing installation of ranges on feeders of ample capacity to handle the service and particularly where efforts are made to install ranges in those sections where sufficient transformer capacity is already available to handle the increased load. During 1917 the Washington Water Power Company's installation costs on 215 ranges requiring additional transformer installations were as follows, per range:

COST OF INSTALLATION—WASHINGTON

Pole line	$20.24
Conductors	31.87
Transformers	38.99
Total	$91.10

In addition to the above ranges, a large number were placed on existing transformer installations, so that the total capital required to take care of range service was less than $50.00 per range.

During the same period the Utah Power & Light Company, with special efforts devoted to securing range installations on existing transformer installations, had a total capital expenditure per range, with 706 installations, as follows:

COST OF INSTALLATION—1917—UTAH

Meters	$ 6.94
Services and miscellaneous	15.03
Transformers	6.60
Extension of primaries and secondaries, exclusive service	4.98
Total	$33.55

Due to the increased cost of materials in 1918 over 1917, the costs for a representative month of 1918 covering 25 range installations were as follows, per range:

COST OF INSTALLATION—1918—UTAH

Meters	$ 9.28
Services and miscellaneous	8.56
Transformers	12.48
Primary extension cost	6.70
Total	$37.02

Following is an example of cost of single range installations where the transformer installation was already ample to care for range service:

25 lbs. No. 4 W.P. wire	$ 7.50
10 " No. 8 " "	3.00
1 10 amp. 3-wire meter	8.66
2 No. 1820 strain	.40
2 pins and insulators	.16
Miscellaneous material	.50
Store expense	.50
Labor to install	5.00
Auto expense	1.50
Total	$27.22

In connection with the financing of range sales, central stations who do not care to handle financing themselves should be able to use bank acceptances for this purpose.

Customers Willing to Pay Increased Costs

In reference to the question of customers not being willing to pay increased cost of electric ranges, this does not work out in practice. Coal and gas ranges have advanced even more in cost than have electric ranges. As a result, customers seem to be even more willing to purchase the higher priced electric ranges. The customer's ability to purchase useful articles and particularly labor saving devices seems to be greater than ever. The increased cost of other fuels is, of course, another contributing factor in the customer's desire for electric range service.

One interesting result of this situation is that range sales are made with much less effort and considerably less expense than heretofore, consequently reduced sales force does not necessarily mean inability to make range sales.

The Effect of Range Loads on Peak

In reference to the question of scarcity of power supply, your committee feels that the average central station does not appreciate the actual effect of range loads on its system. Five hundred ranges will not increase the peak of the system over 200 kw. and in many instances considerably less than this amount. The monthly consumption of these ranges amounts to 50,000 kw-hr. which gives a load factor of 34.7%. A rate of 2.7% net is a very satisfactory rate for this class of business, as it results in earnings of $75.00 per kw. where the average annual earnings of the customer are $30.00 per year, and $100.00 per kw. of system maximum demand where the earnings are $40.00 per customer per year. When investment costs for range service are held down to a figure between $36.00 and $50.00 per range, no objection to high investment cost should be made.

ability of making as few changes as possible during the war.

Replacement of Elements

Your committee has requested the manufacturers to extend the guarantee on the life of elements to at least two years. We are very pleased to report a marked improvement in the life of elements during the past 12 months period. This, however, continues to be a considerable expense in the operation of electric ranges which must be borne either by the consumer, central station or the manufacturer. We are of the opinion that the consumer should not be expected to replace on the average more than one burned-out element per year after the first two years of operation of the range and believe that the manufacturers' efforts should be directed towards this end.

No condition has arisen during the year which has resulted in the change of opinion as to the relative merits of the enclosed vs. the open coil element. Both types of element are continuing to give satisfactory service.

The general consensus of opinion is that the rates already in effect for electric cooking are adequately satisfactory to the consumer for this business. The general increases in cost of other cooking fuels has been, of course, an important factor in encouraging electric range installations by customers.

The average annual earnings from electric ranges vary with different central stations from $24.00 to $50.00 per year, depending upon the type of customers served.

LIBERTY LOAN WINDOWS

(Besides buying you will want to help sell Liberty Bonds. The electrical contractor-dealer has a splendid opportunity to help the country through his window displays. Here are some suggestions of how other dealers have advertised the Liberty Loan, as well as some new ideas worth trying out. A group of really distinctive windows worthy of the dignity of your store.—The Editor.)

The Liberty Loan Campaign is to open September 28th and for nearly three weeks thereafter the thoughts of the entire nation are to be fixed on this one object. There will be few electrical stores throughout the country who do not devote some portion of their window space during this period to pushing the loan. It is part of the patriotic service

If you use the flag do not place anything upon it. A simple yet effective window used to advertise the last Liberty Loan campaign.

which no establishment can afford to confess itself as unenterprising enough to neglect.

And while you are being patriotic, there seems to be no reason why your window should not be one to add distinction to your store. A Liberty Loan poster pasted against a more or less fly-specked pane in front of a dusty heap of lamp sockets is of very little help to the government's campaign—and adds nothing to your own reputation. Duplicates of the poster may be seen on every cigar stand and its slogan "Buy a Liberty Bond" is soon forgotten, while the disorderly window is kept in mind to rise up against you when some worth while purchase is to be decided upon.

Many effective windows were worked out by electrical shops the country over during the past three Liberty Loan Campaigns. A brief description of some of these, together with suggestions as to other possible windows may prove of value in working out your own display to be installed September 28th.

RECORD OF THE DRIVE was made the feature of several windows during the last campaign. A huge thermometer was built up the front of one electrical dealer's store with the degrees marked off to the sums required to make up the city's quota. The 100% mark of course was the boiling point—and the whole was entitled "Make it hot for the Kaiser." A red tape wound on a spool below and held in place by an almost invisible string was easily adjusted to represent the rising mercury. An effective window to combine with this would be a display of electric heaters with appropriate signs pointing out other ways of making it hot.

THE FAMILIAR CLOCK, which is blocked off as the hands move around toward the completed subscription was combined with another indicating the passage of days until the end of the drive by one dealer and the two attracted considerable attention in his window. It was very easy to see just how the drive was going in proportion to the time allotment. The electrical appliances featured in connection with this were labor saving devices which were advertised as saving both time and coal, thus releasing both for government service.

AN ELECTRIC FAN formed the basis of a display which attracted a great deal of attention recently and might easily be applied to the Liberty Loan Drive. A large hoop of wire about eight feet in diameter suspended at the ceiling of the window space formed the frame from which was suspended a circular curtain of red, white and blue mosquito netting. This was gathered into a similar hoop at the bottom just large enough to fit comfortably with plenty of leeway about an electric fan placed

on its back on the floor of the window. Red, white and blue balloons marked with plain letters "Ships," "Ammunition," "Food," "Guns," "Supplies," and similar government expense items, were caged within this funnel and kept in motion by the fan. The slogan "Keep the War Moving by Supplying the Funds—Buy Liberty Bonds" provided the explanation for the window.

"IN THE SERVICE" is the title of a window which can be made most effective, both from the standpoint of the Liberty Loan and the electrical business. A background of Mazda lamp cartons piled into a fort with electric flashlights as guns gives the warlike atmosphere. Brown paper cambric makes a parade ground of the window space, and a row of potatoes dressed as guardsmen across the front of the window bear the standard "Use Potatoes and Save Wheat." With a little ingenuity these potato soldiers can be made very comical as well as quite martial. Skewers serve as legs and arms, raisins as buttons and eyes and colored paper as hats. A second row, a little higher, built up by a shelf under the brown cambric, shows a row of electric irons in the service. These are turned bottom side to the front and with cloth arms and feet, dangling over the step, a face pasted on the shiny surface and little soldier caps of paper, they serve very well as soldiers, bearing the banner, "Use Electric Irons and Save Time and Coal." A top step still a little higher provides the parade ground for a series of rolls of paper legibly labeled Liberty Bonds. These are belted about the middle and with faces, buttons, cardboard guns and paper caps, are obviously in the service. They bear the slogan, larger than the others, "Buy Liberty Bonds and Put Your Money in the Service."

EXTERMINATING THE KAISER was made the subject of a window display which had the interest of a charade at the same time that it drove home the Liberty Bond idea. The word "Exterminate" was divided into its syllables and each illustrated in a tableau with the letters below so that the whole spelled the word. The phrase was then continued below to read **"Exterminate—**the Kaiser by Buying Liberty Bonds." "Ex-" was represented by a cartoon labeled "After the War" which showed the dejected Kaiser in rags, without his crown, looking at an empty and cobwebbed throne. "Term-" showed the Kaiser again, this time behind bars (an ordinary picture of the Kaiser and a gridiron furnished the details of this tableau). "In-" was a representation of the under world made with a red covered electric light, some pointed strips of red crinkle paper and a fan which kept them streaming upwards. Rising from this fiery furnace was the Kaiser's head and two hands upraised in the familiar kamerad attitude. "Ate" showed a toy lion borrowed from the nursery for the occasion, from whose mouth projected the head of the Kaiser. Eight of the allied flags formed an effective background for this.

A PAIR OF HANDCUFFS were throned in the center of one window labeled "Government Bonds—in Germany" with the further explanation, "In Germany Government Bonds are the Symbols of Slavery—in America of Freedom—Buy Liberty Bonds." A star formed of shining percolators radiated from the pedestal on which this was displayed and a row of Liberty Loan Posters made an attractive background.

KEEPING THE GUNS SUPPLIED with ammunition by buying Liberty Bonds, was featured in a western window which utilized a dummy gun and an electric fan as specialties. The gun was mounted upon a miniature mountain of sockets and small supplies and was of the wooden toy variety. It was attached to an electric fan which oscillated slowly back and forth, sweeping the window. Streamers of red, white and blue were attached in its mouth and kept fluttering tensely by the fan. A row of light cardboard German soldiers, each with an elastic band attachment which kept them erect were bent down to earth before it, springing up as the wind was directed elsewhere, to be knocked down again at the next sweep. An American flag and a Liberty Loan poster formed the background. The fan was attached to an ordinary lamp socket.

HELPING TO WIN THE WAR—The Liberty Loan Subscription Card of the store showing 100% subscription was featured as the center of this display which showed in a series of windows throughout the week various ways in which electricity was helping to win the war. The electric fan display, for instance, was shown with a tray of dried vegetables and the statement of the part electricity had played in conserving food. The electric washing machine was shown to release the time of a washerwoman for other service and to save the clothes. An electric cutting machine and a sewing machine were displayed as they are used in Red Cross work. The efficiency of the electric range and iron were dwelt upon, in which the fuel is not wasted up the chimney—and the consequent saving of oil and coal. The service of electrical men and organizations in the community, both in the army and navy and on Liberty Loan committees and the like with statement of activities in former campaigns, was featured with pictures and cards given as receipts in Red Cross, Y. M. C. A. and past Liberty Loan campaigns.

Electrically driven pumps and farm machinery were accompanied by statistics of the increased crops of the state since the war began. A display of Mazda lamps was explained by pictures of well lighted factories, the local drill ground, etc., with figures showing the service of efficient lighting in war factories. Coils of wire, insulators and transmission line material completed the exhibit with a poster telling of electric service which drives the wheels of almost every war industry.

DO NOT, if you are planning a patriotic window, use the flag as a drape on which to rest electrical appliances. The only object which may be placed upon the flag is the Bible and that only when it is used as an altar cloth. Hang the flag at the back of your window, if you wish—and floodlight it from a group of flashlights arranged about the window and connected up with a storage battery to burn longer. A simple window of this sort is often the most effective.

BUILDING A BUSINESS ORGANIZATION

BY CLOTILDE GRUNSKY

(The selection of employes is unquestionably the foundation stone upon which the security of a business rests. Each concern has its own methods which vary from written applications to psychological examinations. A report of the effective system of building up a working force in use by the Pacific States Electric Company.—The Editor.)

Replacements from Within—

The loss of no one man should put a business out of commission. In small organizations, of course, the business is often built around the personality of the owner, but even in this case, he should have trained up a trusted lieutenant under him so that the entire concern would not be thrown out of operation, should he slip on a banana peel, for instance, and be laid up for three weeks.

WHERE THE OFFICE WORK IS DONE

The offices are all laid out on the same general plan. Glass partitions are not only sound proof, but they help to stimulate the general feeling of working together and to keep up interest even in the tired hours of late afternoon.

This is even more the case with salaried positions in a large company. It is not always possible to find outside material capable of filling managerial positions on short notice, nor is it always a wise policy to draw such material from without the ranks. To grow your own leaders is unquestionably the soundest policy of any organization. Not only are the managerial positions thus filled by men who are familiar with the details and policy of the individual business, but the lower ranks are made up of a more enterprising and ambitious group of workers, attracted by the possibility of advance. The business organization becomes a flexible unit of sound and vigorous growth, capable of weathering changes and accidents of labor conditions.

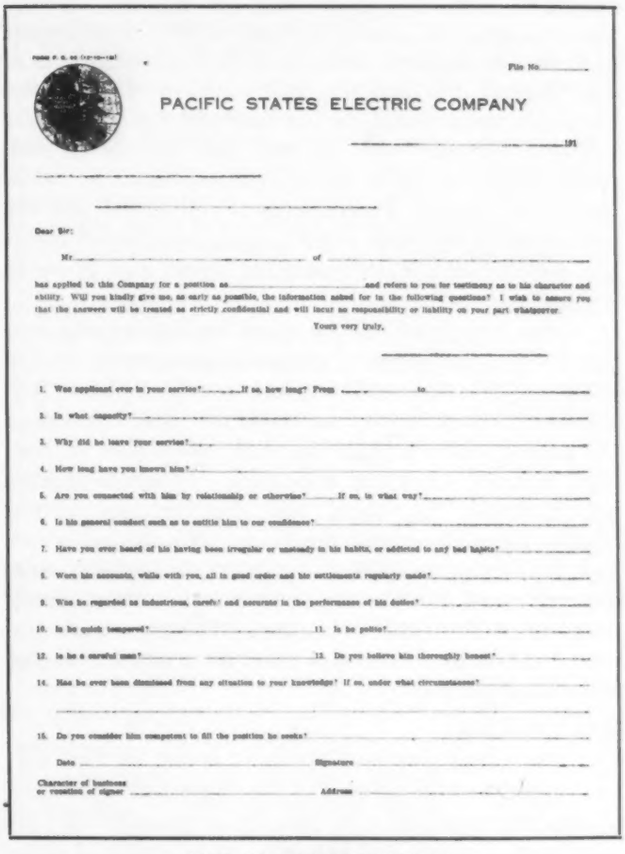
The Selection of Workers—

With this principle in mind, the San Francisco office of the Pacific States Electric Company has worked out a plan of building up its force to this condition of healthy unity. In the first place, great emphasis is placed upon the selection of workers. No employe is engaged without filling out an application blank and references are followed up in each case by a letter of inquiry. Great importance is placed upon the health of employes and a physical examination is prescribed for all men added to the force. Up to the present time this regulation has not been extended to women employes.

The questions asked on the blank sent business men whose names are given as references are of particular interest as indicating the care with which the selection is made:

The Questionnaire—

1. Was the applicant ever in your service?—If so, how long?
2. In what capacity?
3. Why did he leave your service?
4. How long have you known him?
5. Are you connected with him by relationship or otherwise?—If so, in what way?
6. Is his general conduct such as to entitle him to our confidence?
7. Have you ever heard of his having been irregular or unsteady in his habits or addicted to any bad habits?
8. Were his accounts, while with you, all in good order and his settlements regularly made?
8. Was he regarded as industrious, careful, and accurate in the performance of his duties?
10. Is he quick tempered?
11. Is he polite?
12. Is he a careful man?
13. Do you believe him thoroughly honest?
14. Has he ever been dismissed from any situation to your knowledge?—If so, under what circumstances?
15. Do you consider him competent to fill the position he seeks?



PACIFIC STATES ELECTRIC COMPANY

File No.

191

Dear Sir:

Mr. of

has applied to this Company for a position as and refers to you for testimony as to his character and ability. Will you kindly give me, as early as possible, the information asked for in the following questions? I wish to assure you that the answers will be treated as strictly confidential and will incur no responsibility or liability on your part whatsoever.

Yours very truly,

1. Was applicant ever in your service? If so, how long? From to
2. In what capacity?
3. Why did he leave your service?
4. How long have you known him?
5. Are you connected with him by relationship or otherwise? If so, in what way?
6. Is his general conduct such as to entitle him to our confidence?
7. Have you ever heard of his having been irregular or unsteady in his habits, or addicted to any bad habits?
8. Were his accounts, while with you, all in good order and his settlements regularly made?
9. Was he regarded as industrious, careful and accurate in the performance of his duties?
10. Is he quick tempered? 11. Is he polite?
12. Is he a careful man? 13. Do you believe him thoroughly honest?
14. Has he ever been dismissed from any situation to your knowledge? If so, under what circumstances?
15. Do you consider him competent to fill the position he seeks?

Date Signature

Character of business or position of signer Address

SENT TO THE REFERENCES

The former employer or friend who receives this questionnaire must think twice before giving a blanket recommendation. There are very few cases in which employes thus checked up do not prove satisfactory.

Space is left for signature and address, with note as to the character of business or vocation of the signer.

The Interview—

This data, together with the application blank is filed away and added to from time to time during the life of the individual as an employe of the company. If for any reason relations prove unsatisfactory, this record is noted down and added to the file. Thus complete data on the individual is available at any time for the purpose of answering inquiries from without as well as within the organization.

The applicant is always personally interviewed and considerable importance is laid on first impressions. If the man is able to sell his own services, he gives promise of being capable of selling the product of the company he represents. During the conversation he is asked some such questions as "Why do you want to work for the Pacific States Electric Company?" to draw out his attitude toward his work. If possible the interview is divided into two parts and in the meantime arrangements are made for him to see some other member of the organization and that person's opinions concerning the applicant are noted down as a check.

Educating the Beginner—

Once employed, the beginner is thoroughly initiated into the policies of the company. It is the custom to hold salesmen's meetings weekly, with monthly conferences which all employes are expected to attend. The aim is to avoid conflicts and to weld the organization into a working whole. Any report of ill feeling between individuals or departments is at once looked into and the policy and welfare of the company pointed out as the one end for which the business is conducted. In this way the petty jealousies between office forces and salesmen, or salesmen and shipping departments are obviated and the organization becomes truly a unit, capable of meeting difficulties and surmounting them and growing normally to meet opportunities as they arise.

No small part of the good feeling among employes is to be found in the provisions made by the company for rest and comfort rooms. Three well outfitted rooms for women employes, opening out on the roof, provide a place for their noon-time gatherings, a lunch room and a kitchen. Separate lockers are provided for each, and comfortable resting chairs, magazines and a phonograph are at hand. The kitchen is completely outfitted electrically, thus driving home the electrical idea and making every member of the force a booster. The men have the use of the sales conference room on a lower floor for their noon period.

War Conditions—

The labor shortage brought about by the war has of course taken many of the important members of the organization and greatly increased the proportion of women, but the ideal of a healthful, self-replacing unity has been maintained in so far as possible.

Western Ideas

APPRECIATING YOUR PRODUCT is half way to a sale. It is the man who really believes in the merit of what he sells who convinces the customer. In this connection the following extract from the Gas Age, comparing gas with electric appliances, is of interest:

A great many houses are now using some of the following electric appliances: Irons, fans, toasters, coffee percolators, tea samovars, vacuum cleaners, warming pads, milk warmers, chafing dishes, washing machines, utility motors for sewing machines, polishing buffers, knife sharpeners, cream whippers, bread mixers, heating stoves, water heaters and numerous others. These are all useful and convenient articles and with two or three exceptions have no gas competitors. The gas man has neglected some opportunities here, just as he did in lighting. The gas iron was not perfected until after the electric iron had been in succesful use for years. I know of many houses that were lost to gas lighting by first being wired for an electric iron or an electric fan, which led to general wiring for lighting and the displacement of gas. It has been common practice for some time to include floor and baseboard outlets in electric house wiring installations. They have made it convenient for the use of electric appliances. The gas man is just beginning to appreciate the value of auxiliary outlets, and is again a laggard following the electric man's lead.

These are modern times, the public is demanding new and modern conveniences. Cost is a small consideration. We have allowed the advent of small electric appliances into the home; by a little foresight some of this might have been prevented. The gas man has allowed his competitor to get a foothold which may ultimately endanger his present firm hold on the heating and cooking business.

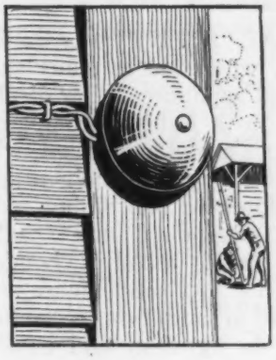
But the electric range does not have to go through the educational period, for the public is ready to take up electric cooking just as soon as it can be convinced of the practicability of the electric range. Past experience in lighting has taught the gas man that cost is not an all-important consideration. The electric range claims the following: Easy operation and control, heatless, odorless and economical; easy of operation and control by means of automatic heat regulators and time limit devices; heatless and odorless due to good insulation; economical due to better efficiency. Easy control is certainly an advantage which should be adopted by the gas range.

The gas range is little better than half as efficient as the electric range. Recent tests show that the top surface of the electric range requires but 64 per cent of the energy necessary to do the same work on the top surface of the gas range. The electric range oven requires but 23 per cent of the energy necessary for the same work in a gas range oven. The electric range oven is much more efficient in proportion than the top surface as compared with the oven and top surface of the gas range. Under actual household conditions the electric range re-

quires about 55 per cent of the energy used by the gas range to do the same work.

Of course the moral pointed in this article is in favor of the use of gas, but the facts noted, however, should be familiar to every electrical dealer as well as the gas company.

THE EMPLOYER OF LABOR in large numbers immediately becomes a prospect for the electrical contractor. A loud electric bell or ordinary gong is an easy means to summon yard men when they are beyond calling distance of the voice, as suggested by the Atlas Portland Cement Company's publication. The electric bell is superior to the gong because a greater number of combination rings can be used without confusion. The electric bell is suited to the requirements of yards which employ a large force and which occupy a large area. The number of employes with whom rapid communication is desired will decide whether the bell or the gong will fill your requirements.



This should be installed on the outside of the office or at some central point where every one can hear it when sounded. Assume that the foreman is given number one, his assistant is given number two and another employe is given number three. When the foreman is wanted at the office you ring the bell once (press the button and release it immediately); for his assistant you ring it twice and for the other employe you ring it three times.

It is advisable to repeat the ring much the same as a fire alarm is sounded. If the third employe is wanted ring the bell three times (press the button and each time release it immediately so the rings are uniform); allow fifteen seconds to intervene and repeat the three rings. This will enable employes to properly respond to the call.

Whenever several employes are involved it would not be necessary to assign numbers like five, six, seven, etc., to them. A series of combination short and long rings would fill the requirements in the following way:

Employe	No. of Rings	Employe	No. of Rings
First	One short	Fifth	Two short
Second	One long	Sixth	Two long
Third	One short—one long	Seventh	Two short—two long
Fourth	One long—one short	Eighth	Two long—two short

The number of combination rings which can be developed with the electric bell are practically unlimited.

It is not difficult to memorize the different rings when a reasonable number is involved. However, if there is any possibility of confusion a small card can be printed explaining the meaning of the combinations and each man can carry this card for reference.

The rings can be used to instruct all men to report at a particular point in the yard. For example: An empty truck arrives and must be loaded immediately. Two rings would indicate that the yard men were to go to the lumber shed; three to the cement shed and four to the office. Here again the electric bell has many advantages over the gong because of the numerous combination rings which can be arranged.

SELLING APPLIANCES in groups is a plan of which good use has been made by a California company. Special prices were made for each group, of course, but the reductions in general were small and did not impair the profit to any great extent. More important still, the value of the individual article purchased was not lowered in the eyes of the customer. To feature a sale of five dollar irons for $3.00 is permanently to ruin the market for five dollar irons—but a combination of articles sold at a reduction does not leave the same doubt in the mind of the public as to how the dealer can do it if the original price was not extortionate. Similar devices are grouped together, the following being some of the classifications used: Breakfast group: toaster, percolator, egg boiler. After theater group: chafing dish, toaster, percolator. Nursery group: water heater, heating pad, disk stove. Laundry group: washing machine, 6-lb. iron, ironing machine. Kitchen group: knife sharpener, dishwasher, fan. Housework group: vacuum cleaner, dishwasher, washing machine. Sewing-room group: sewing machine motor, 3-lb. flatiron, vacuum cleaner. Boudoir group: vibrator, hair-dryer, curling iron, fan.

Many other groups can readily be devised, their limit depending only on the number and variety of devices the dealer has in stock.

A LIVE MAILING LIST is after all the most essential part of a mail campaign. One electrical contractor-dealer of the West keeps in touch with market possibilities through the want ad columns of the papers. On the theory that the home without a washing machine is the one which needs one, he carefully scans the newspaper for advertisements for maids or laundry help. Washerwomen advertising the taking in of wash are good prospects. One such enthusiastic user of an electric washing machine will spread the gospel throughout her group of customers. Birth announcements offer the opportunity to sell milk warmers and light dimmers. Following up announcements of intended removals often leads to contracts for wiring or lamp orders. A well written letter to fit each such case is ready for the emergency and is followed up later by a personal call.

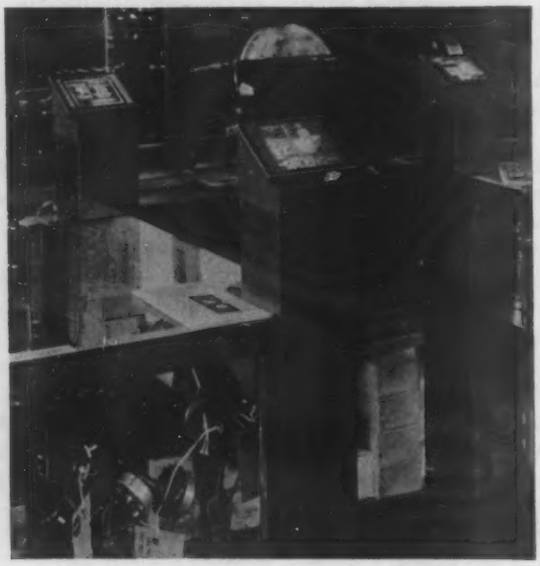
LOCAL ADVERTISING falls rather heavily on the overhead expense which eats so disastrously into profits. And yet it has been proved over and over again that advertising does increase sales. As a means of improving the ratio of the profits derived from advertising with the cost involved, four dealers in one western city have worked out a scheme of cooperative advertising. In this way they can get a bigger and more effective display in the leading newspaper. They figure that there is enough business in the community to support them all—or else there should not be four stores represented—and being located in different districts they really draw upon an entirely different group of customers.

Once a week they take a full page in the papers, advertising heating appliances and other electrical goods for the home. The goods advertised, of course, are such as are in the stock of all the members of this little association.

In this way each dealer actually gets the benefit of the full amount of the advertising, although his bill is actually smaller than when he paid for the smaller space alone.

DISCARDED LANTERN SLIDES after being put to use in the nearby moving picture theater are apparently of little value, but the Southern Electric Company of San Diego has found a way to use them very effectively, according to a recent issue of Contact.

Manufacturers have become very generous of late years in furnishing advertising slides, some of them very beautiful and artistic, all of them costing real money. But beautiful and effective as they are,



A most effective advertisement at little cost

they must be changed from tim to time like any other advertisement, to attract attention, and the dealer who makes proper use of them accumulates quite a library in time, of slides that have served their purpose on the screen but are too good to throw away.

The Southern Electric Company has found a way to keep these slides working. It is not expensive but it is very effective because its very novelty attracts attention and gets the slides' message across.

This company has one of the largest retail electrical stores on the Pacific Coast with many show cases. The show cases are built with high corner posts, as the picture illustrates. On each post is a little metal frame containing a miniature lamp, and grooves into which slip the lantern slides. The lamps are connected to skidoodle plugs which wink the lights on and off in a way that compels attention.

While waiting for their purchases or for a clerk to wait on them, customers are attracted to these slides and are unconsciously forced to read the advertisements on them. Very frequently they ask to see the appliance that is thus flashed upon their minds.

Not the least attractive feature of this scheme is the ease with which unlimited changes and combinations can be made, seasonable apparatus featured, special drives made.

A great deal of favorable comment has been heard on this installation, and some local merchants have ordered duplicate installations, some of them having blocks fitted on their counters to hold the frames—a simple operation.

A HOME ELECTRICAL "STUNT" was worked out by a lighting company which led to many sales both of wiring contracts and appliances. For display purposes an entire floor in a lighting company's building was converted into a model apartment, with electric cooking appliances occupying their proper places in the immaculate kitchen; the dining room with electric percolator, chafing dish, and toaster upon the daintily spread table; milady's boudoir with its electrical appliances for convenience and comfort, and other rooms so arranged as to produce the most desirable effects in lighting, and exhibit appropriate appliances and fixtures.

One entire room was given over to a display of such lighting fixtures and equipment as could not be exhibited in the other rooms of the apartment without detracting from the effectiveness of their arrangement. An orchestra dispensed music each afternoon and evening, and the exhibition soon took on the atmosphere and importance of a real social event in the community.

Each visitor was invited to register and upon registering became entitled to participate in the distribution of gifts, one or more of which were presented each evening, with the more valuable ones remaining until the final day. Free wiring and fixtures for a five-room house or apartment, value $25; one vacuum cleaner value $40, were included in the list of gifts. The awards made each night were announced the following day by means of placards in the show window.

Thirty-three contracts for wiring and installatio of fixtures were actually signed during the week that the display was in progress, and the sales of various household utilities reached a large figure.

FOURTEEN RULES FOR ELECTRICAL CONTRACTING PRACTICE

The following Code of Practice is recommended to architects, consulting engineers, contractors and owners as well as owners' engineers, by the National Association of Electrical Contractors and Dealers, the Executive Committee of which adopted and approved it as a step toward the standardization of many practices in connection with the original contracts and those for extras which, unless definitely settled in advance, leads to misunderstanding on both sides and frequently to controversies and litigation. The National Association does not, however, attempt to bind its members to use this code, but respectfully submits same for the approval of both customers and contractors.

Rule III. The contractor shall be paid monthly in cash at least 85% of the value of the materials delivered and the labor performed.

DEALERS' WINDOW DISPLAY EXCHANGE

BY A. L. SPRING

(To secure eight times the value for the same expense. A system of window display exchanges which not only gives the individual dealer credit for eight effective windows at the labor and cost of only one, but means sixty-four shots at the public interest every time the round of exchanges is completed. An account of some of the successful work of the California Cooperative Campaign—by its Southern California representative.—The Editor.)

Electrical dealers throughout the country are beginning to realize the valuable asset they have in their show windows and some of them are materially increasing their appliance business through attractive window displays. The representatives of the California Electrical Cooperative Campaign are ready and anxious to assist the dealers in California by in some cases decorating their windows, and in all cases offering suggestions for attractive feature window displays. It is a worry to the electrical dealer to know what to put in his windows that is new, attractive and has considerable drawing power, yet there is hardly a business that offers a better opportunity for feature moving window displays than ours.

I recently called on a dealer in Santa Barbara

EXCHANGING THE CROWD AS WELL

When a window display is effective enough to draw a crowd like this—it is a shame not to try the same influence on the population of other communities. Passing around the displays means passing around the crowds—and the customers.

and discussed with him several window display ideas. In the conversation he mentioned that he had recently made and used a clever moving window display which attracted considerable attention, and as he was through with it he thought that it might well be used by some other dealer. An exchange was made of this display for one which had been suggested to a dealer in Pasadena by the Field Representative of the Campaign and which the dealer had excellently worked out. This exchange enabled both of these dealers to show two attractive moving feature displays with the effort and expense of making but one. The thought suggested itself that this could to excellent advantage be carried further. The result is, we are forming a dealers window display exchange in Southern California. Eight dealers in six different cities will be on the circuit. Each of them will make a feature moving window display and show it in his window for two weeks. At the end of that time each dealer will forward his display with instructions for setting up and operating to the next dealer on the circuit. By this exchange method each of the eight displays will be shown eight times and the public will therefore see sixty-four exceptionally attractive windows in dealers' stores instead of eight. Also these window displays will be more attractive for the reason that each of these dealers when making a display will know that for his work he will have eight feature displays to show instead of one, and he will therefore make a better display. If any dealer in the circuit does not have in mind a feature display which he can make, several ideas which he can work out will be given him by the Field Representative. All of these displays will be known and referred to by the name of the firm which makes them and there will be a rivalry to see who can make the most clever and attractive display. When this first set of displays have made the circuit, another set will be made and go the rounds. The first eight displays will then be used extensively by dealers in the smaller towns. The dealers' window display exchange should greatly improve the dealers' windows, thereby increasing their sales, and should raise the estimation of the dealers in the minds of the public who must be impressed with this slogan, "Buy your electrical appliances from the electrical dealer."

IF I WERE A MANUFACTURER

BY RUSS HOLABIRD

(This series of talks which has been given before the Electrical Development League of San Francisco has offered the opportunity for each branch of the industry to point out its virtues by way of contrast. In this short statement, a prominent jobber of San Francisco tells what he would do if he were a manufacturer.—The Editor.)

If I were a manufacturer I would first decide whether my products could most efficiently be distributed by my own organization or if it would be the economical and best thing to rely on the jobber organization for its distribution.

In either case, whether I decided to distribute or to rely on the distributor, I would inform myself reliably as to the cost of such distribution.

I would fix my selling price so as to provide for this cost.

If I decided to rely on distributors to sell my products I would not sell the distributor and also solicit the business of their trade.

I would recognize each branch of the industry as having its proper place in the general scheme.

I certainly would not enter into competition with my distributor, but I would exploit my line among engineers, architects and construction men by an energetic campaign pointing out its excellence, and I would find pleasure in the friendship of the jobber who under these circumstances could be relied upon to put his entire organization behind my line.

ECONOMIC CONDITIONS IN RUSSIA

BY FEDOR F. FOSS

(One of the most prosperous regions of the world in which the people have the fewest comforts, a country of extremes—Russia. A few statistics which present an illuminating picture of the conditions in the most interesting region of the world today. Over one thousand cities out of only twelve hundred in all Russia are still illuminated by kerosene lamps. Perhaps the biggest prospect for the after-the-war spread of the electrical gospel. The author was official representative of the Russian Ministry of Commerce in the United States.—The Editor.)

A Nation of Extremes

The conditions ot Russian life before the great world war started can be descrbed by the words of Gregor Alexovsky, who wrote the book "Modern Russia:

"Contradictions abound in all spheres of Russian life." In the economic domain we see modern capitalism developing itself with American celerity, beside the mediæval villages whose economy is still almost natural. In the social domain the proletariat, eager to procure the triumph of the ideal of universal happiness and trained in the ideas of a theoretical socialism, live side by side with feudal seigneurs who do not recognize even the most elementary demands of justice.

In the political domain the most sincere and ardent aspirations towards liberty contend against the worst possible methods of repression.

In the literary and artistic domain—while many Russians are known far beyond the frontiers of their own country for the novel simplicity and profundity of their thought, 120,000,000 inhabitants of the Russian soil are absolutely illiterate.

The youth of the intellectual and working classes are materialistic atheists. But the most barbarous prejudices, the most primitive fetishism, constitute the mentality of the Russian peasant.

On the one hand is arrogant aristocracy incessantly feasting in stone built capitals. On the other hand are millions of human beings sheltered under straw roofs and nourished by black bread.

One of our most prominent poets, Nekrasoff, saddened by the contrasts of Russian life, said in one of his poems:

"And poor and abundant
And mighty and impotent
Art thou, O our Mother Russia."

These contrasts demonstrate not only the backward state of the country and its isolation from the great nations of Europe, but its material and spiritual dependence upon those nations.

The contrasts of Russia are formed by the clash of modern European, and if you will, universal ideas, and the remains of the Middle Ages, the heritage of that period when Russia still lived her own life and was not yet drawn into that mill of the world which crushes in its mighty stones the grain of all humanity to make the bread of the future.

The Distribution of Population

The density of population varies greatly in different parts of Russia, and is comparatively very sparse. It averages 10 inhabitants to one square kilometer. The most dense population is 114 (Moskow), 104 (Kiev), and the smallest density is 0.4, among the Jews.

For general information I quote the following figures:

THE POPULATION OF RUSSIAN PROVINCES

		Total Population to 1 sq. verst.	Total Population to 1 sq. verst.
Province of	Riazan	73.1	68.8
	Kharkoff	70.3	59.8
	Toula	68.3	60.3
	Koursk	78.2	71.4
	Petrograd	78.5	20.4
	Poltava	84.8	76.5
	Kieff	104.1	87.5
	Podolva	107.1	99.3
	Moskow	114.7	57.2

The distribution of the population in various parts of Russia is shown by the following figures:

A map of Asia showing the distribution of population, the dark shading indicating density. The vast majority of Russia's population are rural as can be seen—and with the high illiteracy, it is obvious that the body of the nation are but little affected by the revolution. In comparison with civilized countries, Russia occupies first place in numbers and last in average per square mile.

DISTRIBUTION OF POPULATION STATISTICS

	Town Population %	Rural Population %
European Russia	13.2	86.8
Siberia	11.6	88.4
Central Asia	13.6	86.4
Caucasus	13.1	86.9

Primitive Conditions in Town Life

In comparison with the civilized countries Russia occupies the first place in the population and the smallest average per square mile.

In 1912 out of 1065 towns and urban settlements with a population exceeding 10,000 (the number of urban settlements is 182), only 219 had an organized water supply, or 20% of the total number.

Of these only 204 are for general use. In 15 towns they are for the needs of special government institutions.

Of the remaining 204 towns only 167 provide water to private houses. In 52 urban settlements water systems do not supply houses, the inhabitants having to fetch water from the central reservoirs. There are settlements with a population exceeding 100,000 which have no water supply.

Only 59 systems with extensions to house have filters. Only 40 towns have canalization.

The refuse of the towns is carted to some distance from the town in the majority of municipalities, but few of the towns have special places reserved for the purpose.

In 61 cases the refuse is washed by high water, in 24 by ground water, and in 5 by high and ground water. In 492 cases all refuse is thrown in the sea, rivers and ditches, or not removed at all.

The Use of Electricity

In the whole of Russia, out of 1231 towns, 1068 have public lighting, of which 162 have electricity, 128 gas, 1028 by kerosene (you call it distillate), etc.

1047 towns have slaughter houses, 1136 fire brigades, 54 tramways, 32 telegraph service and 314 telephone service.

There are 902 towns with public libraries (in U. S. 18,000 libraries) and reading rooms, 76 towns publishing 919 periodicals and 178 towns publishing newspapers. (The largest circulation was about 200,000 copies a day.)

In the United States there are more than 22,000 periodicals.

About 510 towns have printing presses, 124 have typolithographic establishments, and 609 towns have photographic establishments.

There are 136 towns with museums.

An Agricultural Country

In order to outline the conditions of economic life of Russia I shall mention that out of all the production of Russia, which we reckon around 20 billion roubles, more than half belongs to agriculture.

The land question is the basic question for Russia, and when that is settled she will improve and progress very rapidly.

The country has a tremendous area suitable for agriculture, forming one-third of the total surface in European Russia, something around one billion acres. Moreover, there are large areas in Siberia and Middle Asia.

Of this land 39% is owned by the government, 36% belongs to peasants and 25% to other private owners.

Five-sixths of all the peasant owned land is held communally. This means that a community uses the arable land, the woods, the meadows and water supply in common.

About 270,000 acres are sown to cereals, potatoes and foddergrass.

The figures of crops you can get from any government report, and I have to mention only that the largest output in cereals in Russia is rye (35 million tons), wheat 24 million tons, oats 13½ million tons, barley 10 million tons, and potatoes 27 million tons.

Even Agriculture Undeveloped

If we compare Russia with the United States according to relative area under cultivation we find that in the United States this area constitutes 10% of the total land area, while in Russia it constitutes but 5%.

Taken with reference to the population of the two countries, we find that to each inhabitant of the United States there are about 2½ acres of cultivated land, while in Russia there are only 1½ acres.

The prevalent method of agriculture in Russia is still primitive. It is the three crop system, and Russia has one of the lowest average yields of cereals per acre, averaging, e. g., for wheat 10 bushels, against 15 to 18 in the United States, 17 in Roumania, 20 in Germany, 30 in Sweden, 34 in England, and 44 in Denmark.

At the same time it is very important to show that the expenditure per acre for soil improvement in Russia is the smallest.

In Norway it is $1.00, in Prussia 67c, in Sweden 25c, in the United States 21s, in Russia 5c.

Because of a faulty system of manuring the fields, the absence of artificial irrigation, and the primitive implements employed, the peasants' economy is completely dependent upon atmospheric conditions, or as the peasants say, on God.

Russia is the largest sugar-beet producer in the world and has made wonderful progress in the production of cotton.

Some of Russia's Unused Resources

In mining and metallurgy Russia, in despite of vast resources, takes a very remote place from the United States, the first producer of metals in the world.

MINE PRODUCTION IN RUSSIA, COMPARED WITH U. S.

The production of coal averages		40,000,000 tons
	against	500,000,000 tons
The production of pig iron averages about		4,500,000 tons
	against	50,000,000 tons
The production of copper averages		40,000 tons
	against	2,000,000 tons

Lead and zinc, silver and tungsten are merely started in production, and only in platinum are we leading the world, producing 95% of the total output.

A People Poor in Necessities

In the consumption of all necessities Russia is at the bottom in comparison with other nations.

Consumption of coffee is 0.14 pound per head in comparison with 11 lbs. in the United States.

Tea, 0.91 in comparison with 1.1 lb. in U. S. and 6 lbs. in United Kingdom.

Consumption of sugar—0.5 lb. against U. S. 1.5 and United Kingdom 2.5.

Consumption of pig iron—50 lbs. against 1100 in U. S.

Consumption of coal, copper, lead and spelter is on even a smaller scale, so that I do not want to mention these figures. That has to be left for closer study of Russian economic conditions.

A Vast Opportunity for the Taking

All this shows that Russia with her inexhaustible resources is a large field for development.

Russia has one of the largest systems of railroads in Europe — about 50,000 miles — but when you make a calculation per square mile or per head of population, then the figures are very small. In such a case they represent 1 kilometer for 100 square kilometers of area in European Russia, and 0.07 of a kilometer for 100 square kilometers in Asia.

For 10,000 inhabitants it represents 4 kilometers in European Russia and 5.8 in Asiatic Russia.

In the United States these figures show 4.3 kilometers for 100 square kilometers and 42 kilometers per 10,000 population.

As I mentioned before, it can be seen from these figures, that in despite of the fact that Russia was an old empore, she is quite a young country from the point of view of development, from the first necessities up to the education of the people. She dreamed of freedom, but she was oppressed under the autocracy. She was poor and undeveloped, with practically no industries, but with faith in her future.

The relative importance of the different occupations of the Russians is shown by the following figures:

RELATIVE IMPORTANCE OF OCCUPATIONS

Rural occupations	77%
Manufacturing and other industries	10%
Private and personal services	4½%
Trade and commerce	3.8%
Transportation	1%
Mining	.4%
Professions connected with public needs	.7%
Government public service	.6%

The same figures for the United States show:

Agriculture	35.7%
Manufacturing and industry	24.4%
Commerce and trade and transportation	16.4%
Personal services	19.2%

Public Health and Scarcity of Doctors

According to the last census the contagious cases and infectious diseases averaged 19,500,000, being 12% of the total population:

To every 100 cases the proportion of diseases was as follows:

	Per cent.
Itch	22
Malaria	18
Influenza	15.5
Syphilis	6.5
All forms of typhus	3.3
Trachoma	5.0
Dysentery	4.3

This table shows you that the first thing is the lack of hygiene and preliminary sanitation.

The latest available figures about our doctors is for 1912 and they show that we had about 22,000 doctors (including 1,750 women doctors). In European Russia there is one doctor for 1300 inhabitants in the towns and one for 21,900 in the villages. In Asiatic Russia one doctor for 2800 townspeople and one for 37,900 in villages.

The number of beds in hospitals has been about 220,000. During the war it has been enormously increased.

Of every 1000 infants 267 die before they are one year old. The birth rate is 45 per 1000.

Education in Russia

The following figures show the state of education:

RUSSIA HAD 52 SUPERIOR SCHOOLS

18	universities and places of general instruction
4	ecclesiastical
3	pedagogic
5	medicine
2	law
1	military
1	land surveying
1	forestry
9	technical
2	commercial
2	general
2	language academies

These schools had 75,000 students.

There were 135,000 middle and primary schools with 9 million scholars, 7,400,000 of which (82%) attended elementary schools, 530,000 (36% secondary schools, 290,000 or 3% official elementary and secondary schools and 272,000 or 29.8% higher education. The remaining 500,000 or 7% attended private schools.

The expenditure for the last years came to 150 million roubles, or $70,000,000.

Compared with the United States

I do not need to quote the figures for the United States, but in order to make the comparison easier I shall remind you that you have in the Union (figures for 1915) about 270,000 elementary schools, with school and college enrollment—

STATISTICS FOR THE UNITED STATES — 1915

Elementary	19,600,000	
Secondary	1,500,000	
Universities and colleges	220,000	
Professions and normal schools	160,000	With 700,000 teachers and with annual expenditures of upwards $800,000,000.
	21,480,000	
Special schools (evening, business, etc.)	1,000,000	
	22,480,000	

NORWEGIAN MARKET FOR ELECTRICAL FIXTURES

The natural resources of Norway have a strong bearing on the market for gas and electrical fixtures. The country is barren of deposits of coal, which is secured principally from England, and the difficulties attending its importation have raised ocean freight rates to such proportions that the use of both coal and gas is constantly decreasing. On the other hand, natural water power is abundant and electricity is for many purposes a cheap and ready alternative. Practically all city houses are wired for electricity, while quite a number are unequipped for gas supply. Gas is now 0.20 crown ($0.054 per cubic meter) and electricity 0.26 crown ($0.07 per kilowatt hour).

Electricity is the generally employed means for illumination and about the only use of gas in the dwelling house is for cooking, though even in many of the modern homes it is often done over ordinary coal ranges, in which wood is substituted as a fuel. Little, if any, heating is done by gas.

PRIMER OF INDUCTIVE INTERFERENCE

BY D. I. CONE

(The causes of residual voltages in grounded neutral circuits—and the serious effects in the problem of inductive interference. One of a series of papers on the elements of this complicated problem—by a man prominent in the recent investigation of this subject in the West.—The Editor.)

Residual Voltage of Grounded-Neutral Power Systems

Several causes operate to set up residuals in grounded neutral circuits, in contrast to isolated circuits, where commonly the only cause is unbalance of capacitances of the wires to ground.* Assume balanced voltages (equal in size and 120° apart in phase) impressed from the three line wires to ground. Unequal capacitances to ground of the line wires cause unequal charging currents over them, which do not exactly balance each other, hence giving

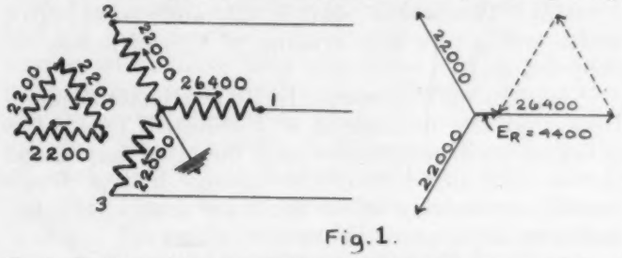


Fig. 1.

Fig. 1.—Residual voltage of groundde-neutral circuit due to unequal transformer ratios

rise to a residual current. The impedance-drop of voltage incident to these currents in the line-wires and transformer windings unbalances the voltages to ground, that is, sets up a residual voltage. As in the case of the isolated line, transpositions throughout the line to balance the capacitances will eliminate this source of residuals.

Unequal loads connected from the wires to ground set up residuals in the same way as just described.** Star-connections made up of transformers of different load-rating, and single-phase loads from one wire to ground are examples of such unbalancing. Here the remedy is to provide like transformers for the units of each bank, and to avoid the single-phase loads to ground.

Inequalities in ratio among the units of a bank of transformers supplying a line will cause a residual voltage, as shown in Fig. 1. The transformer from wire 1 to ground has a 12 to 1 ratio, the other two being 10 to 1. With balanced voltages (2200 volts) impressed on the delta, the voltages to ground on the star-connected line side are as shown in the vector diagram. The dotted lines show graphically the summing up of these voltages to determine the residual voltage. For every frequency present in the impressed voltages there is a corresponding residual voltage component, in this case 20 per cent of the balanced voltage to ground, of the given frequency.

A very important cause of residual voltage in grounded-neutral circuits is the variation of permeability of the transformer iron, which is usually operated at magnetic density approaching saturation. This gives rise to a pulsation of the inductive reactance of the transformers during each cycle, and has the effect of a group of generators of frequencies 3, 5, 7, 9, etc. times the operating frequency in series with each winding of each transformer. In a three-phase system the voltages so induced, of three and nine times the fundamental frequency, are in the same phase in all three transformers, while the voltages of five and seven, etc. times the fundamental frequency are in balanced three-phase relation. The neutral being grounded on a star-star transformer bank the voltages of three (and multiples of three) times the fundamental frequency appear as residual, causing a residual current through the three transformer windings and line wires in parallel, to earth and back to the neutral, by way either of line capacitance to ground or other transformer banks. This is the effect so often referred to as third—or triple—harmonic residuals. (See Fig. 2.) A delta connected

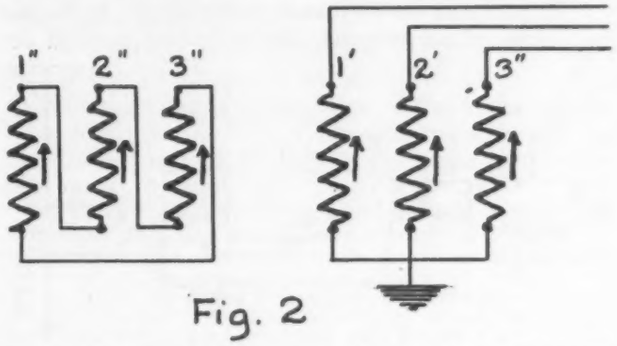


Fig. 2

Fig. 2.—Third-harmonic residual voltages, due to variation of permeability of transformer iron, in a delta-star transformer bank with grounded neutral.

winding on a transformer acts as a shunt path for these triple-frequency currents, thereby greatly reducing the residuals. The many transformer banks with grounded neutrals in a large network make the problem of tracing this type of residuals one of much complexity.

Reviewing briefly the reasons why residuals are of such great importance in inductive interference study, we have:

(1) They do not transmit the useful energy, that being the function of the balanced currents and voltages;

(2 Transposition of the power circuit within a parallel does not reduce their detrimental effects, except indirectly in some conditions.

(3) The inductive effect for a given amount of residual voltage or current is much greater than for like amounts of balanced components.

(4) For telephone circuits, the residuals are more detrimental because they usually contain a larger proportion of frequencies within the range of speech frequencies.

*See discussion on p. 124, Vol. 41, Aug. 1, 1918.
**See also discussion on p. 75, Vol. 41, July 15, 1918.

EXHIBIT OF FOREIGN ELECTRICAL GOODS

At the district office of the Bureau of Foreign and Domestic Commerce at New York, there is on display a large collection of samples of electrical goods used in foreign countries. These samples have been forwarded mainly in connection with the special investigations undertaken in Australia, New Zealand, China, Japan, and Eastern Siberia by R. A. Lundquist, special agent of the Bureau. Complete data accompany each article on exhibit, giving country of origin, where obtained, how used, selling price, etc.

A METHOD OF MEASURING ANTENNA CONSTANTS

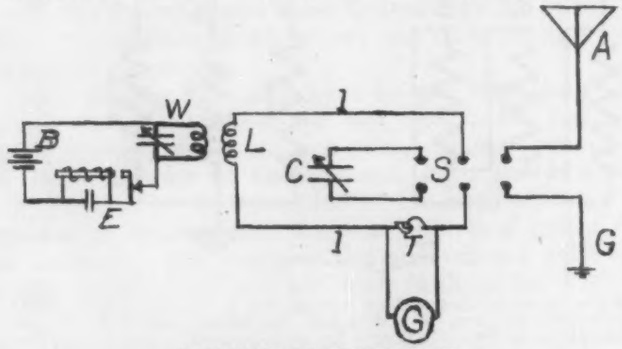
BY WALTER HAYNES

(The growing importance of the wireless has been given a tremendous impetus by war demands—and today it is one of the branches of electrical enterprise which promises most interesting development. New improvements and methods are finding daily application. The following is a suggestion for a short cut in the method of finding antennae capacity and resistance by a man intimately associated with radio work.—The Editor.)

For almost all experiments upon an antenna it is desirable (if not imperative) to know its capacity and inductance.

The measurement of these two constants by the usual methods involves the taking and plotting of a considerable number of observations. The magnitude of the capacity, or inductance, is then read off the corresponding axes as an intercept. Moreover this procedure requires two series of readings to be taken, one for each constant.

In carrying on an investigation of the radiating properties of an antenna, the following method occurred to the author, and is offered here as an improvement upon the more lengthy methods, both from the point of simplicity and accuracy.



DDIAGRAM OF CONNECTIONS

A—The antenna under test. D—Earth connection of antenna. W—Wave meter. E—A buzzer exciter for wavemeter. B—Battery for operating buzzer. T—Thermo-elements. G—Galvanometer. C—Calibrated variable condenser. L—Fixed inductance (two values). 1-1—Wire leads. S—Double pole, double throw, switch.

This method requires but two observations for determining both the capacity and inductance of an antenna.

Throughout the following description like symbols will refer to similarly lettered parts of the figure. In order to avoid introducing unknown capacity and inductance the leads 1, 1 should be as short and close together as possible. The inductance L, must be capable of being set at either of the two known values, preferably not differing from the antenna inductance by more than 100 or 150 per cent.(*)

Perhaps the easiest understanding of this method can be gained from its modus operandi which is as follows:

(a) Close the switch, S, on the antenna (and ground) and adjust the wave meter excitation for a maximum deflextion of the galvanometer, G. This will indicate resonance and the emitted wave length of W will be the resonance wave length of the antenna for the particular valve of L used. Let this value of wave length be recorded as λ_1, and the value of L used as L_1.

*Two separate coils can be easily made and their inductance calculated with a very high degree of precision by any one of several formulas given in the "Bulletin of Bureau of Standards," Vol. 5, No. 1.

Here as in all quantities experiments on coupled circuits the smallest coefficient of coupling between L and W that will give reliable galvanometer readings should be used.

(b) Close S on the calibrated variable condenser, C, and with W unchanged adjust C for resonance at the wave length, λ_1. Record this value of C as C_1.

(c) Substitute a new value of inductance, L_2 at L, and repeat (a), thus getting λ_2.

(d) Throw the switch, S, and repeat (b), which will give a new reading of C, which may be recorded as C_2.

Now by making the perfectly legitimate assumptions that the inductance of the loop S T 1 L 1 C S is negligible in comparison with the other terms, and that a very slight resistance change in the circuit doesn't appreciably affect the wave length, the following equations may be written, where:

La = The antenna inductance.
Ca = The antenna capacity.

From the theory of an oscillatory discharge through a low resistance, we may write, from data obtained in (a)—

(1) $\lambda_1 = K\sqrt{(L_a + L_1)\,C_a}$ and from (b)

(2) $\lambda_1 = K\sqrt{L_1\,C_1}$ Similarly from (c)

(3) $\lambda_2 = K\sqrt{(L_a + L_a)\,C_a}$ and from (d)

(4) $\lambda_2 = K\sqrt{L_2\,C_2}$ from (1) and (2)

(5) $C_a = \dfrac{L_2\,C_2}{L_2 + L_a}$ and from (3) and (4)

(6) $C_a = \dfrac{L_2\,C_2}{L_2 + L_a}$

Whence, eliminating Ca and La between (5) and (6), gives respectively,

$$L_a = \frac{L_1 L_2 (C_2 - C_1)}{L_1 C_1 - L_2 C_2}$$

(8) $$C_a = \frac{L_1 C_1 - L_2 C_2}{L_1 - L_2}$$

As an example a test was made upon a typical commercial antenna, which gave the following data:

$L_1 = 0.324$ milli henry
$L_2 = 0.248$ " "
$C_1 = 0.005625$ micro farad
$C_2 = 0.005901$ " "

Substituting these values in (7) and (8) gives:

La = 0.0607 milli henry
Ca = 0.00474 micro farad

It is noteworthy that these values were substantially the average of several sets of values made by the more tedious methods.

In using the above method it will be found even simpler than it looks at first sight.

THE RECAPTURE CLAUSE IN THE WATER POWER BILL

BY C. E. GRUNSKY

(By the provisions of the "recapture clause" in the water power bill now before Congress will be determined whether private capital is to find power development projects attractive or unattractive—whether the bill is to attain its end, in other words, or fail. A clear exposition of the exact status of the water power situation and what may be expected of it, together with a suggestion as to a way out of the difficulty—by a valuation expert.—The Editor.)

The Purpose of the Clause—

Congress is at the present time giving consideration to a bill which is intended to encourage the development of the water powers of the country. This measure will provide for a taking over by the United States of any plant thereunder established at the expiration of the lease or license term upon certain conditions which are to be fair to the owner of the property and to the United States. Various recapture clauses have been under consideration and a final conclusion as to the exact language to be used has not been reached. The purpose of the various clauses which have been suggested and which have come to notice appears to be to protect the parties who lease water powers, against the loss of legitimately invested capital. But there is much diversity of opinion as to how this can best be accomplished.

Thus, for example, there are some who believe that the fluctuating value of the gold dollar when measured by what it will purchase must be taken into account. The estimated cost of reproducing the elements which make up the property will then be the controlling factor. This prompts the use of the term "value" in defining what should be paid for a property when it is to be taken. How else, it may be asked, than with due regard to the value of the project elements would it be possible to give credit to the owner for first cost and also the manifold other later expenditures extending perhaps over long periods of time, which have resulted in a betterment of the plant? And again there are those who believe that only the actual necessary and proper (legitimate) cash outlay which was made to establish the plant should be returned when the plant is taken. These would ignore the fluctuating purchasing power of the dollar and would assume that the obligation of the public is fulfilled when the dollar invested 10, 20 or 50 years ago and which has in the meantime been earning an interest return, is given back to the party from whom the government takes the property. In a middle ground there is still another group who would have the investment adequately safeguarded and returned but under a definition of what is meant by investment and with rules for estimating the same such that account is taken both of depreciation and appreciation.

The Adamson Bill—

In the Adamson bill, which relates to the utilization of water powers on navigable streams as framed by the Interstate and Foreign Commerce Committee and passed by the House of Representatives on August 4, 1914, the recapture clause after specifying that two years notice must be given if property is to be taken before expiration of a lease and six months notice after its expiration, contains the following:

> "Before taking possession the United States or the person authorized by Congress shall pay therefor (first) the actual cost to the grantee of lands or any interests therein purchased and used by the grantee in the generation and distribution of power, and (second) the fair value of the other properties taken over," etc.
>
> "In determining the fair value of the property other than lands or interests in lands allowance shall be made for deterioration, if any, of the existing structures and transmission lines, and no value shall be claimed or allowed for the rights hereby granted, for good will, going concern, profit in pending contracts for electrical energy, or for other conditions of current or prospective business or for any other intangible element."

The Ferris Measure—

A few days later on August 24, 1914, the House passed the Ferris water power bill which had been in the Public Lands Committee. After providing for three years notice which can only be given in the last three years of the life of the lease in question this measure provides:

> "That it" (the United States) "shall pay, before taking possession, first, the actual costs of rights of way, water rights, lands and interests therein purchased and used by the lessee in the generation and distribution of electrical energy under the lease, and, second, the reasonable value of all other property taken over, including structures and fixtures acquired, erected or placed upon the lands and included in the generation or distribution plant" .. .. .. "Provided, that such reasonable value shall not include or be affected by the value of the franchise or good will or profits to be earned on pending contracts or any other intangible element."

In the modified form in which the Ferris water power bill again passed the House on January 8, 1916, the recapture, upon the expiration of the lease, was provided for upon condition:

> "That it" (the United States) "shall pay .. .. .. the fair value of such property .. .. .. provided that such fair value shall not include or be affected by the value of any public lands, rights of way, franchises, or other property leased or granted under this act by the United States or by the good will or prospective revenues."

The Adamson Substitute—

Again in the Adamson substitute for the Shields bill, relating to water powers on navigable streams which was passed by the House on July 14, 1916, there is a recapture clause which provides:

> "That the United States may also purchase at its discretion such lands and other property of any grantee acting under the terms of this act as in the judgment of Congress may be deemed advisable upon condition that it shall pay before taking possession, first, the reasonable value, not exceeding the actual costs of the dam, or diversion structure, and locks and all other aids to navigation constructed under the approval of plans and specifications, rights of way, water rights, lands and interest therein purchased or taken over by it, and, second, the reasonable value of all other property taken over, including structures and fixtures acquired, erected or placed upon the lands and included in the generation or transmission plant" .. .. .. "Provided that such reasonable value shall not include or be affected by the value of the franchise or good will or profits to be earned on pending contracts on other intangible elements."

The "Value" Clause—

The provisions for recapture in these four bills which had all received the approval of the House of Representatives, are based in the main on the proposition that the owner of the property is entitled to

recover the value of the property taken. In the Ferris water power bill as passed on January 8th, 1916, "fair value" is specified without further qualification. Under the Adamson substitute as passed on July 14, 1916, "reasonable value" not exceeding cost would have been allowed for some items and "reasonable value" for others. In the other two bills cost is to be allowed for certain items such as lands, rights of way and water rights but fair or reasonable value for all other properties. Where value is thus specified this is certainly intended to mean that the cost of reproduction at the time of the taking must be considered. Appreciation will thus be included and depreciation deducted. There is but little to be said against such a program except that what is meant by value, reasonable value, and fair value—terms which had better not be used in this connection—should be clearly defined. It would be better to state specifically that what the licensee may recover is the amount which it would cost to reproduce the elements for which compensation is to be made. This would be the estimated cost of reproduction new at the time of taking, less accrued depreciation.

The Present Clause—

In the water power bill now before Congress the recapture clause first adopted by Secretaries Lane, Baker and Houston and approved by President Wilson was as follows:

"Upon the condition that before taking possession it" (the United States) "shall pay the fair value not to exceed actual cost of property taken, plus such reasonable severance damages, if any, as may be caused by the separation of said property from property valuable, serviceable and dependent as above set forth, but not taken," .. .. .. "Provided that such fair value shall not include or be affected by the value of any lands, rights of way, or other property of the United States licensed by the Commission under this act, by the license or by good will, going value or prospective revenues: Provided, further, that the values allowed for water rights, rights of way, land, or interest in lands shall not be in excess of the actual reasonable cost thereof at the time of acquisition by the lessee.'

Here again fair value is specified, but in the case of certain properties the value is restricted to the actual reasonable cost thereof at the time of acquisition by the lessee. If the elapsed time between an investment and the recapture by the United States falls into a period such as that of the last four years in which the value of the gold dollar has fallen about 45 per cent the return of the original investment would be palpably inadequate. Ordinarily between the time of original construction and the taking over by the United States considerable time will elapse and some shrinkage in the value of the dollar when measured by what it will buy, must be expected, and some fair allowance for this shrinkage should be made. Consequently when a return of the original investment is contemplated the amount returned should be the original investment corrected according to the altered purchasing power of the dollar.

The Investment Amendment—

This comment applies with still greater force to the "Investment Amendment" as subsequently requested by the three Secretaries and introduced into the pending water power bill by the majority of members of the Water Power Committee of the House of Representatives (Congressman Scott Ferris dissenting). The following is from this amendment:

"Upon the condition that before taking possession it" (the United States) "shall pay the net investment of the licensee in the project or projects taken, plus such reasonable damages, if any," .. .. .. "Provided that such net investment shall not include or be affected by the value of any lands, rights of way, or other property of the United States licensed by the Commission under this act, by the license, or by good will, going value or prospective revenues: Provided further that the values allowed for water rights, rights of way, lands or interests in lands shall not be in excess of the actual reasonable cost thereof at the time of acquisition by the licensee."

By "net investment," as defined in the bill, is meant the actual original cost plus similar costs of additions and betterments minus the sum of the following items: Unappropriated surplus, credit balances in current depreciation accounts and amounts held in amortization or sinking fund accounts or expended for additions or betterments. According to this provision much dependence would have been placed on the book records in ascertaining the amount of the net investment.

Not only does the objection above noted to any proposition involving the return of the actual cost apply to the net investment proposition but, furthermore, claim might thereunder be made to a recovery of investments which were unwise or unfortunate. This may be the case when, due to fortuitous events, bad management, or otherwise, the original cost is greater than it ought to have been and greater than it should be assumed to have been.

Defects of the Recapture Clauses—

All of the recapture clauses thus far suggested have their defects. When value is specified without proper qualification and a definite statement that something else is really meant besides value, the United States may find itself embarrassed when it comes to the taking over of a property in which appreciation from whatever cause is a material factor. When net investment or original cost are specified a sacrifice is forecast and there will be little encouragement to capital which is shy of the uncertainties that are thereby introduced. There has fortunately been no suggestion of gradual acquisition as would result by allowing the licensee to recover in the earnings his entire investment in a project within the life of the license. This would not be good policy. It would not only place a heavy burden on the rate payer but would also place a premium on neglect near the end of the term and such a policy once adopted would make transition later to a more reasonable program difficult.

The other question relating to retaking the property before the expiration of a license term which received much attention in earlier discussions, has now apparently been happily settled in favor of no such retaking. The licensee is entitled to know that he may enjoy the prospective earnings for a long period of time. He is equally entitled to assurance that the allowed earnings will fully compensate him for making the proposed power development. He will expect a fair return on his investment after allowance for operating expenses including adequate provision for current depreciation. Private capital should be encouraged to invest in the development of water powers, thereby making the output of energy available earlier than if development had to await the use of public funds for the purpose.

District Steam Heating As Related to Fuel Conservation

BY HARRY S. MARKEY

(The use of exhaust steam as a means for fuel conservation is highly recommended by the Federal Fuel Administration. Here are timely data on this important subject gathered by the steam power plant specialist for the Great Western Power Company. This is one of a series of papers on fuel conservation to be read before the joint meeting of local sections of the five national engineering societies in San Francisco Sept. 26, 1918.—The Editor.)

In the following paper I propose to give extracts taken from the records of a district steam heating system serving an area of approximately 56 city blocks in the business, hotel and apartment districts of San Francisco, and operated in conjunction with a main steam electric generating station.

The steam is supplied from two well equipped and efficiently operated central stations, and is delivered through underground pipes to be used for heating buildings of all classes and for heating water for domestic purposes. For many reasons such a system should be economical in the use of fuel oil for heating purposes, especially if turbo-generators are interposed between the boilers and the consumers, because electric energy so generated reduces the load on the main steam electric generating stations and results in a direct saving of fuel oil. The standard recommendations of the United States Fuel Administration, item "g," as published in the July Journal of A. S. M. E., reads as follows:

> "That wherever possible, exhaust steam be utilized to the exclusion of direct steam from the boilers. The plant should be designed and operated to produce no more exhaust than can be efficiently utilized in heating and process work."

Without going into the theory of the subject I will give you actual results with only so much explanation as may be necessary.

The fuel burned in the steam heat stations during the twelve months ending August 31st last amounted to 129,893 bbls. Maximum and minimum months were January, 16,043 bbls. and August, 7102 bbls.

During the same twelve months the steam stations produced 6,411,990 kw-hrs. Maximum and minimum months were, January 947,030 kw-hrs. and August 319,590 kw-hrs. In addition to the electric energy some power is developed in a pair of large steam driven elevator pumps, but as this power would have to be estimated no account is taken of it in the records. A comparatively small number of consumers who are not within reach of the exhaust mains are served from a high pressure main with steam direct from the boilers which develops no power. If these two items were taken into consideration all results would be effected favorably.

Because of the electricity generated the district steam system is credited with fuel, the exact amount of which can be determined only from thermodynamic considerations. An allowance which is practically correct can be made as follows: The use of steam turbines in the line increases the fuel consumption by 8%, or 10,340 barrels for the year. The main station generates from 80 to 240 kw-hrs. per barrel depending on the load, the average for the twelve months under consideration being 195.2. The electricity generated at the steam stations, therefore, reduced this year's consumption of fuel at the main station by 32,900 barrels. The difference, 22,510 barrels, was actually saved. This amounts to one barrel for each 285 kw-hrs. generated at the steam stations. The high efficiency of the steam heat stations is due of course to the fact that the heat contained in the exhaust from the turbines is not rejected to a condenser or the atmosphere.

The steam heat stations are therefore to be credited with 22,510 barrels for the twelve-month period, 3325 bbls. for January and 1120 bbls. for August, leaving 107,383, 12,718 and 5982 bbls. chargeable to steam heat for the year, for January and for August.

The steam delivered to consumers is all metered with the exception of about 5%, which is used in open jet apparatus and which must be estimated for each consumer using such apparatus. This estimated quantity is added to the registration of the consumer's meter each month. Including the open jet steam there was delivered to the consumers during the twelve-month period 306,978,000 lbs. of steam, and during January and August 41,609,000 lbs. and 14,914,000 lbs. respectively.

The steam delivered to the consumer is measured by a meter which weighs the condensate returning from the consumer's radiators and other apparatus. The meter therefore registers the weight of dry steam actually delivered to the consumer plus any water that may be in suspension and minus any condensate that is diverted from the meter by leaks in the return pipes, or by valves maintained for that purpose. Both classes of leaks are difficult to locate. The condensate resulting from the conversion of heat into work in the turbines and the escape of heat from the mains through the insulation is drained from the mains at frequent intervals. The service pipes are tapped into the top of the mains. The percentage of water suspended in the steam delivered to the consumer should therefore be small and is probably more than offset by the leaks referred to.

The steam is supplied to the consumers at an average pressure of 5 pounds, and by the steam tables each pound carries 1156 heat units above 32° Fahr. The condensate leaves the premises at a temperature of from 100° to 180° Fahr. and above 32°. To get an even figure assume 156° as an average. Then each pound of steam passing through the premises leaves behind it 1000 heat units. This is the difference between heat put in and heat rejected and is therefore the useful heat delivered to the consumer.

The useful heat delivered to the consumers per barrel of fuel, works out as follows:

For the twelve-month period	2,860,000 units
For January	3,270,000 "
For August	2,500,000 "

Assuming 6,000,000 units as the heat value of a barrel of oil, the the over all efficiency is:

For twelve months	48%
For January	55%
For August	42%

The variation in the demand for steam is such

that for three or four months the larger of the steam heat stations is not operated and for about two months during the winter both are needed. This condition affects the efficiency unfavorably.

Fuel would be still further conserved if there were twice as many consumers connected to this system so that its efficiency would be maintained the year round. During the winter peaks additional steam could be supplied direct from boilers held in reserve for that purpose. The amount of fuel burned under these boilers for a month or two would be small compared to the saving effected at the main steam electric generating stations in a year.

SPECIAL PROBLEMS IN FUEL OIL SAVING

BY ROBERT SIBLEY AND CHAS. H. DELANY

(The first rule of fuel oil conservation is to utilize the fuel in the most efficient way. These problems, typical of situations which arise in everyday practice, will prove helpful in attaining this end.—The Editor.)

Problem No. 1—From a Parker boiler test covering a period of 8 hrs., the following data were taken:

Steam pressure (gage)	185.3 lb. per sq. in.
Atmospheric barometer	30.2 in.
Temp. of water entering the boiler	169.1° F.
Temp. of steam leaving the superheater drum	527.° F.
Specific gravity of the oil at 60° F.	.9705
Percentage of water in the oil	.7 of 1 %
Calorific value of oil per lb.	18,752 B. t. u.
Weight of oil as fired	15,084 lb.
Total weight of water fed to boiler	205,277 lb.

What is the degree of superheat of the steam leaving the superheater?

Solution.

$$\text{Barometer reading} = 30.2 \text{ in. or } \frac{30.2}{2.036} = 14.83 \text{ lb. per sq in.}$$

$$\text{Steam pressure abs.} = 185.3 + 14.83 = 200.13 \text{ lb. per sq. in.}$$

From tables $t_1 = 381.9°$

Temp. of steam leaving superheater drum = 527° F.

$\therefore$ 527 — 381.9 = 145.1° superheat

Problem No. 2—What is the gravity of the oil in degrees Baume in Problem 1?

Solution.

For light liquids:

$$\text{Sp. gr.} = \frac{140}{130 + \text{Deg. Baume}}$$

$$.9705 = \frac{140}{130 + \text{Deg. Baume}}$$

$$.9705\ (\text{Deg. Baume}) = 140 - 130 \times .9705$$

$$\therefore \text{Deg. Baume} = \frac{140 - 130 \times .9705}{.9705}$$

$$= \frac{13.84}{.9705} = 14.26$$

Problem No. 3—What is the weight of the oil corrected for moisture in Problem 1?

Solution.

Percentage of water in the oil = .7 of 1%
Wt. of oil as fired..... = 15,084 lb.
$\therefore$ 15,084 × .007 = 105.6 lb. = Wt. of water in oil
Weight of oil corrected for moisture =
15,084 — 105.6 = 14,978.4 lb.

Problem No. 4—What is the factor of evaporation in Problem 1?

Solution.

$$\text{Factor of evaporation} = \frac{H_s - h_2}{970.4} \text{ (for superheated steam)}$$

From problem 1, $P_1 = 200.13$ lb. per sq. in. and 145.1° superheat.

$\therefore$ From tables $H_s = 1280.1$ B. t. u.

Also from problem 1 $P_2 = 14.83$ lb. per sq. in.

$\therefore$ From tables $h_2 = 136.96$ B. t. u.

$$\text{Factor of evaporation} = \frac{1280.1 - 136.96}{970.4}$$

$$= 1.178$$

Problem No. 5—Determine the equivalent evaporation from and at 212° F. from Problem 1.

Solution.

Total wt. of water fed to boiler = 205,277 lb.
Duration of test..... = 8 hrs.
Equivalent evaporation = Water evaporation per hr. × factor of evaporation =

$$\frac{205{,}277}{8} \times 1.178 = 30227 \text{ lb.}$$

Problem No. 6—What is the boiler horsepower developed in A. S. M. E. rating in Problem 1?

Solution.

$$\text{H. P.} = \frac{\text{Equivalent evaporation from and at 212° F.}}{34.5}$$

$$= \frac{30227}{34.5} = 876$$

Problem No. 7—What is the equivalent evaporation from and at 212° F. per lb. of oil as fired in Problem 1?

Solution.

Wt. of oil as fired = 15,084 lb.

$$\text{Wt. of oil as fired per hr.} = \frac{15{,}084}{8} = 1{,}885.5 \text{ lb.}$$

Equivalent evaporation = 30,227
Equivalent evap. from and at 212° per lb. of oil as fired

$$= \frac{30{,}227}{1{,}885.5} = 16.03 \text{ lb.}$$

SPARKS—Current Facts, Figures and Fancy

(What the freight train can do—A new shipbuilding record—A comparison of speeds—Baseball in the Far East—How to clean old tracings—and a few facts and figures which show the efficiency of electrical baking.—The Editor.)

A "flying boat" is to be used for the detection of fires by the forest service of British Columbia. The boat will permit of landing on bodies of water in regions where very little cleared land is available—while from an aeroplane the observer can view a great area of timberland and quickly summon the aid of the fire rangers.

* * *

According to a bill passed by the last diet the government of Japan has decided to establish a laboratory for the study of the fixation of atmospheric nitrogen. The demand of ammonia for fertilizer amounts to nearly 20,000,000 yen each year and up to now this has been supplied solely by import. It is hoped to make this a local industry in the near future.

* * *

There was an average of 478.2 tons moved by each freight train on American railroads per mile as contrasted with 461.8 last year, or an increase of 3.6%. This large increase in business was handled with a decrease of 71,844,792 freight car miles, or 5.4%, which was accomplished by loading into each car 29.4 tons this year as contrasted with 25.7 tons last year, an increase of 14.4%.

* * *

Formerly the missionary was the only civilizing influence in China, but today Western athletics runs him a close second. A recent report from Shanghai tells of an exciting baseball series between an American team of that city, a crack team of the Ninth Cavalry Negro soldiers of Manila and an all-Japanese team from the Meiji University. One of the most interesting features of the games was the rooting of the Japanese bleachers, who gave their team ardent support, although in a language unfamiliar to the rest of the spectators.

* * *

The greater efficiency of electric cooking and the consequent conservation of fuel was pointed out in a recent article in Elektro-technik and Maschinenbau. Cases are cited of bakeries in which, other factors being as nearly as possible identical, steam ovens used 0.19 to 0.21 kg. of coal per kg. of bread (i. e., 955 to 1,060 calories), while electric ovens used 0.39 to 0.42 kw-hr. per kg. of bread (i. e., 322 to 359 calories). The power consumption of the electric ovens was 90 kw. and 50 kw. respectively.

* * *

Tracings may be very readily cleaned and pencil marks removed by the use of benzine, applied with a cotton swab. It may be rubbed freely over the surface without fear of injury to the lines drawn in ink, or even water colors, but pencil marks and dirt will quickly disappear. The benzine evaporates almost immediately, leaving the tracing unharmed. The surface, however, will be somewhat softened, and should be rubbed down with a little powdered talc or chalk, before drawing more ink lines.

* * *

Trade journals perform a very important service in the encouragement of trade with foreign countries. They are used by every American consul to a greater or less extent. In far-off Durban, South Africa, the consulate exhibit rooms have provided too limited a circulation hitherto and arrangements have been made with the local library for the display of trade journals on a large reading table there. After they have done duty at the library until another lot is taken over, the old publications are then distributed among the trade as usual.

* * *

If we are ever so unfortunate as to hear of the loss in a great battle of, say, 10,000 of our soldiers (10,000 killed) the nation will be moved deeply; yet every year twice, perhaps three times that number are slain in industries of all kinds and almost without its invoking comment, according to a statement by Secretary Redfield. If we were to hear that 1,000,000 of our men suffered wounds in this war, the nation would be troubled; yet industry takes its toll in the form of injuries to persons to an extent nearly three times that number every year.

* * *

Light and electric waves travel 186,000 miles per second, a shell near the muzzle of a 6-inch gun travels 2,500 feet fer second. Sound travels 1,100 feet per second; a revolver bullet near the muzzle, 500-800 feet per second. A fast aeroplane with a high wind in its favor may make 200 miles per hour, a fast car 120, an express train as much as 80 miles and a fast steamship 49 miles an hour. A race horse has been known to make 30 miles an hour, a man skating 24 miles an hour. A good walker travels about 4 miles an hour.

* * *

Speaking of shipbuilding records, a recent telegram announced the laying of a keel in eleven seconds after the launching of a completed vessel at the Foundation Company's yard, Portland, Ore. For the sake of the skeptical a photograph was provided which showed the keel in its trued-up position while the spray from the newly launched vessel was still in the air. The performance was workmanlike in every detail. When the company first become interested in cutting the keel-laying time, 20 minutes for a keel was the best it could do. The next time the record was cut to 16 minutes, then to 6½ minutes, then to two minutes and finally to 11 seconds.

PERSONALS

Chuzo Mori, a civil engineer in the Department of Communications of the Japanese Government and a graduate of the Imperial University at Tokyo, is a recent San Francisco visitor. Mr. Mori has charge of the gaging of streams and the appropriation of water power in Japan. All of the larger hydroelectric work from the diverting of water to the tail race in the development of power comes under his supervision. He is making a year's study in America on the subject in which he is so closely connected in the Island Kingdom. For the next six months he will pursue his investigations in San Francisco and Los Angeles while in the spring he expects to go east and examine into the manufacturing status of electrical ware. He is associated with **Dr. M. Shibusawa** who is still in this country and whose visit was announced at length in the Journal of Electricity for March 1, 1918.

C. J. Miller, well known in the electrical circles of Fort Worth, Texas, was a recent San Francisco visitor.

Madison Grant of the Western Union Telegraph Company has been a San Francisco visitor during the past few weeks.

A. S. Moody, assistant manager of the General Electric Company, Portland, was in Seattle recently on business connected with the company.

Frederick S. Pratt, Chairman of the Board of the Puget Sound Traction Light & Power Company, arrived in Seattle from Boston recently.

E. J. Wallis, Pacific Coast manager of the Western Electric Company, San Francisco, is spending some time in the Northwest on business.

Arthur Fryckland has succeeded L. J. Brown as Sunbeam Lamp specialist for the San Francisco office of the Western Electric Company.

Frank S. Mills, formerly salesman with the Electric Appliance Company, has joined the Engineers' Corps and is stationed at Camp Humphreys.

G. B. Baldwin, of the Pacific Gas & Electric Company from Sacramento, has been in San Francisco recently visiting the home office of his company.

Charles Matthews, chief electrician of Camp Curry, had charge of the installation of ranges and bake ovens recently reported in the Journal columns.

William Kerckhoff, president of the San Joaquin Light and Power Company of Los Angeles, spent several days in San Francisco recently enjoying the fog.

A. J. Blatchford has been appointed chief engineer of the Spokane & Inland Empire Railroad and the United Railways Company, with headquarters at Portland, Ore.

Hugh McPhee, superintendent of the Western Union Telegraph Company at Los Angeles, has been a visitor in San Francisco during the early part of September.

Fred H. Fowler, formerly district engineer of the Forest Service with headquarters at San Francisco, has left for Washington, D. C., where he has accepted a commission as Captain in the Engineer's Reserve Officers' Corps, detailed for special investigation.

Thomas J. McGrath, superintendent of the Hawaiian Electric Company of Honolulu, has been visiting the Pacific Coast, spending some time in San Francisco recently.

James Vandegrift, of Oakland, manager for the Pacific Coast of the National Lamp Works, will spend about two weeks in the Northwest looking over his agencies.

E. J. Sutherland, for two years manager at Richmond for the Pacific Gas & Electric Company's gas office, has left to report for duty with the Aviation Corps at Fort Omaha.

Paul Shoup, head of the electrical lines of the Southern Pacific, returned to San Francisco recently after a visit to Washington for a conference with Director-General McAdoo.

Wm. H. Lines, of the Portland Railway Light & Power Company, has left the company to accept an engineering position with the Northwest Steel Company of Portland, Ore.

Robert Sibley, editor of the Journal of Electricity, has gone to Portland to attend the one-day session of the Northwest Electric Light & Power Association on September 13th.

F. D. Weber, electrical engineer for the Fire Insurance Rating Bureau of Portland, and the Portland representative of the Journal of Electricity, is a recent San Francisco visitor.

F. D. Fagan, of San Francisco, Pacific Coast sales manager of the Edison Lamp Works of the General Electric Company, was in Portland recently while making a tour of the northwest.

L. A. Gains, formerly with the engineering department of the Sierra & San Francisco Power Company, has entered the civil service radio work of the national government at Mare Island, California.

P. H. Dater, district engineer for the forest reserve, was sent from the Portland office recently to examine the work being done by the city of Seattle in construction of its power plant on the Skagit river.

Tatsuji Hara, chief engineer, and **Tokusaburo Yamaguchi,** general manager of the Nippon Hydroelectric Power Company of Nagaoka, Japan, are recent San Francisco visitors.

P. H. Manchester, formerly with the engineering staff of the Pacific Gas & Electric Company and brother of J. C. Manchester of the Economy Fuse Company, is now "Somewhere in France" with the 37th Engineers, the regiment which is made up almost entirely of central station men. He writes: "My mail arrived yesterday and along with nine letters was a copy of The Journal of Electricity (May 15), and my comrade, a French electrician, was much interested in it. As I glanced over it my thoughts went back to dear old San Francisco. Believe me, you don't know how much one appreciates news from the States over here, as it keeps the American spirit among the boys. Of course you know what our unit is for. We have the goods and are now delivering them. Our company is composed of a clean bunch of men from the company commander down, and so far have had no use for a guard house, and now that

If members of the electrical fraternity who join the colors will send word of their doings from "Over There," the Journal of Electricity will be glad to publish their letters.

each man is following his line of work, all are satisfied. I am living among the French, sleeping in the same room with my comrade, and doing my best to speak French. As my comrade has a very good education and has studied English at school, his pronunciation is correct and by his help I can get French grammar instead of slang, as most of them use. The French are very easy to get along with—just a little patience with them and an American is treated like a brother. Yesterday I saw two stray American soldiers taking a walk to a village and stopped them for a chat. One had spent five years in San Francisco and he mentioned several of my acquaintances. France is a wonderful country. The principal point of interest to me is the massive structures they have and the wonderful masonry work. The cathedrals, walls, etc. seem to be built to stand forever. The roads are smooth and are made to stand many years of wear. The water is plentiful but not very good for drinking unless treated. Everybody gives great credit to the Red Cross, as their work over here is wonderful. "Back them up." My comrade was telling of the town which his wife was in being taken by the Germans, in the early part of the war, and afterwards was recaptured by his troops. During that time she was cared for by the Red Cross. As I have a number of letters to answer and my time being limited, I must close.

Very truly yours,

P. H. MANCHESTER

James H. Gilhuly, representative of the Youngstown Sheet & Tube Company at San Francisco, has been elected vice-president of the Electric Agencies Company, special representatives of the Youngstown Company on the Pacific Coast.

J. A. Kinkead, a well known mechanical engineer of New York City, has recently opened offices in San Francisco where he will be a manufacturer's agent for a number of eastern companies that manufacture railway and track equipment.

George V. W. Ingham, who has been a field representative for The Bryant Electric Company in the central western territory for several years past, has been appointed Eastern Sales Manager with headquarters at the factory, Bridgeport, Conn.

A. O. Austin, chief engineer of the Ohio Brass Company of Barbeton, Ohio, has been a recent visitor in San Francisco and is returning east after a successful trip. During his stay, he made a visit to the laboratories of Professor Ryan of Stanford.

Stephen T. Mather, Director National Park Service, made a trip to Yosemite Valley on September 7, 1918, where he presided at the ceremonies which were held on that date at ten o'clock a.m. in dedication of the recently completed Yosemite Power Plant.

John D. Ryan, formerly head of the Montana Power Company and promoter of the electrification of the Chicago, Milwaukee and St. Paul Railway, has given up all his other work to devote his entire time to the furthering of aircraft production, of which he has the direction.

H. C. MacPherson, superintendent of the electrical lines of the Southern Pacific Company, has resigned his position to don the uniform of Uncle Sam. He has received his commission as a captain in the engineering department of the army and will leave shortly for France.

E. F. Dunlap, City Electrical Inspector of the city of Portland, Oregon, has accepted a position as Oregon representative of the Economy Fuse Company, being away on a temporary leave of absence from the city department. **J. K. Soden** is acting chief inspector during his absence.

Lieut. Alan E. Morphy, who has been detailed at the California School of Mechanical Arts, has been transferred to the Central State Normal School College at Edmond, Oklahoma, where he will assume command of the new army training corps recruited for training at that institution.

R. D. Jennings has been appointed agent in the ticket office of the Southern Pacific electric lines in Portland, taking the place of **C. W. Stinger,** who becomes agent in the Union ticket office. Jennings was formerly district freight and passenger agent at Spokane and prior to that was agent at Hillsboro, Oregon.

Raymond Wilson of Berkeley, California, has been placed in charge of the laboratories at the Great Western Electrochemical Company's plant at Pittsburgh, California. It is believed that Mr. Wilson's well known ability along chemical lines will prove of great service in effectively aiding in the present war work of this company.

F. B. Tough, petroleum technologist of the U. S. Bureau of Mines, with headquarters at the San Francisco station of the Bureau, has spent several months in Illinois, cooperating with the officials of the Illinois State Geological Survey and local oil operators in the solution of problems in connection with the work of protecting oil fields from damage by infiltrating waters.

John H. Rosseter recently appointed director of operation of the United States Shipping Board for the new merchant marine has left for Washington to assume his duties. In view of the increased demands for electric energy and the drain upon the fuel oil supply from this war industry, Mr. Rosseter's new work holds much of importance to electrical men.

Nathan C. Kingsbury, vice-president American Telegraph and Telephone Company, and **George W. Robinson,** president Tri-State Telegraph and Telephone Company, have been designated by the Postmaster General for the purpose of making the necessary investigations, conducting negotiations, and arriving at agreements for the unification and consolidation of the various telephone companies operating in the same communities within the United States. Any agreements resulting from these negotiations will be submitted to the Postmaster General for final approval.

Allen H. Babcock, electrical engineer for the Southern Pacific Company with headquarters at San Francisco, has had his jurisdiction extended over the Western Pacific, Tidewater Southern and Deep Creek Railroads, according to recent orders issued by the United States Railroad Administration. Similar orders have been issued for the following: Geo. McCormick, General Superintendent Motive Power; A. Pollok, Supt. Dining Cars, Hotels and Restaurants; R. L. Ruby, Acting Superintendent Transportation; E. L. King, Superintendent of Telegraph; A. S. McKelligon, General Storekeeper, and A. L. Hayden, Contract Agent.

L. F. Helfrich of the Sierra and San Francisco Power Company, together with **W. L. Neelands** of the Western Electric Company at San Francisco, recently imitated "Mutt and Jeff" at one of the balmy beaches north of the San Francisco Bay district. At Willow Camp, where they were staying, much stray matter is thrown up on the beach from far-off Japan and other Oriental points. After comparing the bamboo float to Helfrich and some of the squatty kegs lining the beach to Neelands the local summer crowd dubbed them "Flotsam and Jetsam."

Frederick G. Simpson, vice-president and general manager of the Kilbourne & Clark Manufacturing Co., Seattle, makers of wireless apparatus, has been called into active service and assigned to engineering duties. Mr. Simp-

son has the rank of Lieutenant Commander U. S. Naval Reserve. He has become famous during the past few years for his wireless inventions and improvements. During the past two years through the efforts of President A. C. Kilbourne and Simpson a staff of executive and technical experts had been built up of such efficiency that Simpson has been able to give nearly five months during the last year to aiding the government at Washington. Ralph O. Hall, now assistant general manager of the plant, will act in the managerial capacity.

Major A. H. Griswold, formerly plant engineer with the San Francisco office of the Pacific Telephone & Telegraph Company, is listed among the names of the engineers in France who have applied for authority to organize a section of the A. I. E. E. among the American overseas forces. A large number of Institute members are now in France and there are some three or four hundred engineers stationed in the immediate vicinity where it is proposed to establish the headquarters of the section. Major Griswold, it will be remembered, was connected with the Inductive Interference Committee which recently conducted an investigation into that problem in California. Word has recently been received of the excellent work being done by Major Griswold in France in the organizing of telephonic communication which is largely in his hands.

Paul Holder, brother of C. M. Holder, day clerk of the Denver Tramway Company at South, sends the following letter to his brother from a prison camp in Germany. He was a member of the 22nd Aero Squadron and was captured by the Germans in their spring offensive on the Somme, a short distance from Peronne.

"You have no doubt heard by this time that I am doing a little detached service in the German army. Yes, I was made prisoner during the offensive on the Somme just a short distance from Peronne. I had a most ungodly experience and fell right into the German lines with nothing to defend myself with.

"How is everybody at home? I had received only one letter since I left New York and that was yours of February 18th, so you can imagine I am quite anxious to hear from you. As for my writing letters, we can only write twice a month, so I hope you receive them all right. If you can make me up a little parcel of smokes I certainly can make very good use of them. Put in a pipe, too. I would love to write to all if I had that most desired privilege, but as I cannot, you can do that much for me.

"I am working at a hospital taking care of our allied wounded. It isn't the most pleasant job in the world, but I am glad to be of assistance to some of the poor fellows who are less fortunate than myself.

"There are no Americans at this place. Well, it is getting dark and I can hardly see to write, so I must close, awaiting an early reply. My love to all."

He had his address written at the bottom of the letter, but it had been blotted out by the censor.

Associate Members A. I. E. E.

The following men of the West have recently been elected to membership in the A. I. E. E.:

Apperson, Arthur LaVern, Substation Operator, Portland Railway, Light & Power Company, Portland, Ore.
Barker, George Nesmith, Sales Agent, General Electric Company, Portland, Ore.
Cohen, Lesser R. Solis, Cable Tester, Portland Railway, Light & Power Company, Portland, Ore.
Dee, Ernest Leon, Local Sales Manager, Edison Lamp Works of General Electric Company, Salt Lake City, Utah.
Hodges, Albert J., Radio Electrician, Mare Island Navy Yard, Vallejo, Cal.
Hubbard, Rex Orville, Foreman Underground Cables, City Light Department, Seattle, Wash.
Hubbert, William, Foreman, Electrician, Seattle Construction & Dry Dock Company, Seattle, Wash.
Neill, Thomas William, Superintendent, Kootenai Power Company, Coeur d'Alene, Idaho.
Notley, Charles, Chief Electrician, Power and Meter Department, San Francisco-Oakland Terminal Railways, Oakland, Cal.
Proebstel, Delbert W., Assistant Engineer, Portland Railway, Light & Power Company, Portland, Ore.
Rawson, George W., Foreman, Underground Construction, City Light Department, Seattle, Wash.
Shonerd, Roscoe Edwin, Electrical Assistant to Chief Mechanical Engineer, Hall of Records, Los Angeles, Cal.
Ward, Sidney George, Western Electric Company, Portland, Ore.
White, James Russell, Electrician, San Francisco-Oakland Terminal Railways, Oakland, Cal.
Wigton, W. B., U. S. Navy Coast Inspector's Office, Seattle Construction & Dry Dock Company, Seattle, Wash.

OBITUARY

Squire V. Mooney, president, treasurer and general manager of the firm of John A. Roebling's Sons Company of California, and a leader in the local business world for forty years, died recently in San Francisco, following an operation.

John A. Tisdal, formerly employed by the Central Union Telephone Company, died of pneumonia at Camp Fremont, Cal., on June 15. His remains were taken to Chicago, where they were laid to rest with full military honors.

MARINE ENGINEERS WANTED

The Shipping Board issues the following:

Marine engineers holding land jobs are on a special list kept by the Shipping Board, which may soon call on such mariners to lend a hand in manning the new ships of the merchant marine. The list was prepared by agents of the sea-service bureau of the Shipping Board's recruiting service, who are now holding a convention at Boston.

THE best of the potato is in the peelings, according to careful housewives—and there is many a bit of interesting information which finds its way into the editor's conversation, into the editor's waste basket and eventually into the office vacuum cleaner which might be enjoyed by the readers of the Journal of Electricity as well. At least, so the Vacuum Cleaner thinks—and so in response to its plea, a definite space is hereafter to be given over into its control. Watch for it in an early issue.—The Editor.

MEETING NOTICES FOR ELECTRICAL MEN

(With September comes the resumption of meetings generally suspended for the vacation period. An important meeting of the California Association of Contractors and Dealers and the various fall meetings and conventions of the Northwest are perhaps the events of the greatest interest. An eastern convention on Smoke Prevention discusses the various phases of the coal situation.—The Editor.)

California Association of Electrical Contractors and Dealers

The regular monthly meeting of the California Association of Electrical Contractors and Dealers was held at the Clark Hotel, Stockton, on Friday, August 30th. The morning was occupied by an executive committee meeting, and the members' meeting was held in the afternoon. In the absence of President Reid, T. J. Bennett occupied the chair. A progress report of the work of the committee on the segregation of government electrical work was accepted and the committee instructed to continue its efforts. The Ethics Committee submitted a Code governing the conduct of members in all professional capacities which was adopted and will be given in full in the next issue of the Journal of Electricity.

The date of the next meeting was fixed for Oct. 12th at Modesto.

A banquet and open meeting occupied the evening session. C. E. Condit, president of the Stockton section, presided and directed the program. M. A. DeLew of San Francisco presented an outline of the work of the Association for 1919. R. A. Balzari of the Westinghouse Electrical and Manufacturing Company covered the subject of priority orders from the manufacturer's standpoint and W. S. Berry of the Western Electric Company spoke from the standpoint of the jobber. D. E. Harris of the Pacific States Electric Company pointed out the necessity of close attention to business building methods during war times and urged special effort in the creation of new lines of business endeavor.

About fifty members and representatives of other branches of the industry were present and the meeting was felt to have been a great success. The singing of patriotic songs between courses provided a pleasant variation to the program.

The San Francisco Electrical Development League

League meetings were resumed after the summer interval at a well attended gathering on Sept. 4th at the Palace Hotel. Albert E. Schwabacher, Federal Fuel Administrator for California, was the main speaker of the day, addressing the members on the subject of "The How and Why of Fuel Conservation." H. G. Butler, Power Director for California, also spoke on the subject of power conservation.

A. H. Buckland, formerly of the famous Princess Pat regiment, addressed the meeting of Sept. 11th on "Thrilling Experiences at the Front."

BUILDERS OF THE WEST—XXXVI

GUY W. TALBOT

The great Northwest is contributing invaluable aid to the nation in the present international crisis. The output of the mines, the launching of ships, the logging of spruce for the aeroplanes and the production of fabulous quantities of foods all are being aided in an essential degree by the efficient electric power supply of that section. To Guy W. Talbot, president of the Pacific Power & Light Company and president of the Northwest Electric Light & Power Association, this issue of the Journal of Electricity is affectionately dedicated in appreciation of a life work of effective service in the upbuilding of an industrial and agricultural empire in the Northwest.

The Engineers' Club

At a luncheon talk given Friday, Aug. 16, 1918, J. S. Calbreath, secretary of the American Mining Congress, addressed the Engineer's Club of San Francisco on "The Gold Mining Situation and Its Relation to the Government." Mr. Calbreath came directly from attendance at the Reno conference on gold mining and was intimately in touch with his subject.

The Northwest Electric Light and Power Association

The war time abbreviated convention of the Northwest Electric Light & Power Association was held in Portland at the scheduled time on Friday, Sept. 13th. In spite of busy times and expected omissions, a remarkably good showing was made in attendance. The important papers of the convention were those on the range situation by the Electric Range Committee of which W. R. Putnam is chairman, a consideration of the necessity for curtailing new business in war time by R. M. Boykin and Geo. C. Sawyer, a paper on stores and purchasing departments by V. G. Shinkle and a power survey and a consideration of the problems of priorities in customer service by J. R. King. The report of discussions will be made in the Oct. 1st issue of the Journal of Electricity.

The Oregon Association of Electrical Contractors and Dealers

The annual meeting of the Oregon Association of Electrical Contractors and Dealers will be held on Sept. 20th and 21st, and plans are made for a worth while gathering at this time.

The Synchronous Club

The first meeting of the fall was held by the Synchronous Club of Los Angeles on September 5th. The discussion covered the subject of Los Angeles Railways and was conducted by L. J. Turley and N. Lee Story. Meetings of the club will be held regularly from now on at the usual time and place.

A. S. M. E. Booklet

An attractive booklet entitled "In the Service" has been issued by the American Society of Mechanical Engineers to record the names on the Honor Roll of the society, together with war activities. The pamphlet concludes with a general statement of the work of the society and directions as to how to become a member.

Annual Convention of the Smoke Prevention Association

The thirteenth annual convention of the Smoke Prevention Association was held at Newark, N. J., August 20-22,

inclusive, with headquarters at the Robert Treat Hotel. About fifty delegates from all parts of the country were in attendance, including municipal smoke inspectors from different cities, fuel supervisors and inspectors, railroad officials interested in smoke abatement work, and others.

Following a reception and preliminary business meeting on Tuesday morning, the first regular session was held in the afternoon of this day, with the presentation of the following papers: "Carbocoal," by Newell W. Roberts, Vice-President of the International Coal Products Corporation, New York, descriptive of a new smokeless fuel, one which has been so successful that the Government is now erecting a plant at Clinchfield, Va., for production, to cost about $2,000,000; "Burning a Million Tons of Coal a Year," by Frank W. Casler, General Superintendent of Production, Public Service Corporation, Newark; "Smokeless Combustion with Chain Grate Stokers," by Thomas A. Marsh, chief engineer, Green Engineering Company, East Chicago, Ind.; and "Boiler Room Efficiency," by A. H. Blackburn, chief engineer, the Underfeed Stoker Company, Chicago.

At the Wednesday morning business meeting an illustrated lecture was given by William A. Pittsford, Kewanee Boiler Company, Kewanee, Ill., on the subject of "Bituminous Coals for Heating Boilers." Thursday was designated as "Railroad Day" and two interesting papers were presented.

It was voted to hold the next convention at Chicago, and also to perfect arrangements to have an exhibit hall for the use of manufacturers of power plant equipment at the 1919 annual convention.

Details of Joint Meeting

A joint meeting of the local section of the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Mining Engineers, the American Institute of Electrical Engineers and the American Chemical Society will be held at the Engineers' Club, Thursday, September 26, 1918, at 7 p.m. under the auspices of the San Francisco Local Section of the American Society of Mechanical Engineers.

The subject of the evening is "Fuel Conservation," and it will consist of a symposium of ten-minute papers on this subject, followed by a general discussion, and the meeting will adjourn without motion at 9:45 p.m.

The speakers and subjects are: Mr. Albert E. Schwabacher, United States Fuel Administrator for California, subject, "Fuel Conservation"; Mr. D. M. Folsom, United States Fuel Administration, Oil Division, subject, "Future Requirements of Oil"; Mr. John A. Britton, Vice-President and General Manager Pacific Gas & Electric Company, subject, "The Use of Gas as a Conservation Measure"; Mr. H. G. Butler, Power Administrator, subject, "Electric Consolidations and Their Relation to Fuel Conservation"; Major Geo. F. Sever, subject, "War Industries"; Mr. W. J. Davis, Pacific Coast Engineer, General Electric Company, subject, "Railroad Electrifications as a Fuel Conservation Measure"; Mr. P. M. Downing, Chief Engineer Electric Department, Pacific Gas & Electric Company, subject, "Sources of Energy Supply"; Mr. A. H. Markwart, Civil Engineer, subject, "Production of Energy."

WHERE THE MEN OF THE INDUSTRY MEET

(The place where you can find where and when the other man meets. Information as to changes in officers, or additions or corrections, should be addressed to the Service Editor, Journal of Electricity. It is hoped to keep this directory up to date, so that travelers in a strange town who wish to attend the meetings of allied groups may not be misdirected.—The Editor.)

A. I. E. E.—WESTERN SECTIONS

National Officers
President—Comfort A. Adams, Harvard University.
Secretary—F. L. Hutchinson, Engineering Socity Bldg., New York City.
Meetings—Monthly.

Los Angeles Section
Chairman—Don. D. Morgan, 621 Pacific Electric Bldg.
Secretary—A. W. Nye, University of Southern California, Los Angeles, Cal.
Meetings—Second Tuesday of each month.

Portland Section
Chairman — R. M. Boykin, care North Coast Power Co., 441 Pittock Block, Portland, Ore.
Secretary—W. D. Scott, Portland, Ore.
Meetings—Monthly.

Denver Section
Chairman — Norman Read, 828 Symes Bldg., Denver, Colo.
Secretary—Robt. B. Bonney, 603 Wyoming Bldg., Denver, Colo.
Meetings—Third Saturday of each month, from October to May, at the Denver Athletic Club. Dinner at 6:15 p.m., followed by regular meeting.

San Francisco Section
Chairman—J. C. Clark, Stanford University, Cal.
Secretary—Allen G. Jones, Rialto Bldg., San Francisco.
Meetings — Fourth Friday each month—Engineers' Club, 7 p.m.

Seattle Section
Chairman—John Harisberger, 4015—4th Ave. N. E., Seattle, Wash.
Secretary—Glen Dunbar, City Lighting Department, Seattle, Wash.
Meetings—Monthly on third Tuesday in Chamber of Commerce Assembly Room, 9th floor, Arctic Bldg.

Spokane Section
Chairman — Charles A. Lund, W. 828 Providence, Spokane, Wash.
Secretary—J. E. E. Royer, W. 408 Cleveland, Spokane, Wash.
Meetings—Third Friday of each month.

Utah Section
Chairman—A. S. Peters, Mountain States Telephone & Telegraph Co., Salt Lake City, Utah.
Secretary—H. T. Plumb, 183 U St., Salt Lake City, Utah.
Meetings—Third Wednesday of alternate months, 8 o'clock. Assembly Room of Commercial Club, Salt Lake City.

Vancouver Section
Chairman — R. F. Hayward, Western Canada Power Co., Ltd., Vancouver, B. C.
Secretary — T. H. Crosby, Canadian Westinghouse Co., Vancouver, B. C.

A. I. E. E.—WESTERN BRANCHES

University of California Branch
Chairman—A. J. Swank, University of California, Berkeley, Cal.
Secretary—G. F. Teale, University of California, Berkeley, Cal.

University of Colorado Branch
President—Robt. Newman, 1071—11th St., Boulder, Colo.
Secretary—William N. Gittings, 2429—12th St., Boulder, Colo.
Meetings—First and third Thursdays of each month of the school year in the Engineering Building, University Campus.

Idaho University Branch
Chairman—V. Pearson, Moscow, Idaho.
Secretary—L. J. Corbett, University of Idaho, Moscow, Idaho.
Meetings — First Wednesday evening of each month from October to June.

Oregon Agricultural College Branch
Chairman—J. A. Hooper, Oregon Agr. College, Corvallis, Ore.
Secretary—L. Happold, Oregon Agr. College, Corvallis, Ore.

Stanford University Branch
Chairman—H. W. Lewis, Stanford University, Cal.
Secretary—A. L. Morgan, Stanford University, Cal.

Montana State College Branch
Chairman—Roy C. Flagen, Montana State College, Bozeman, Mont.
Secretary—J. A. Thaler, Montana State College, Bozeman, Mont.
Meetings—Third Friday of every month of the school year in the Electrical Bldg.

Colorado State Agricultural College
Chairman—R. C. Richards.
Secretary—W. A. Stallings, Colorado State Agricultural College, Fort Collins, Colo.

Throop College of Technology Branch
Chairman—J. Paul Youts, Throop Dormitory, Pasadena, Cal.
Secretary—Clark E. Baker, Throop Dormitory, Pasadena, Cal.

State College of Washington Branch
Chairman—S. E. States, 301 Montgomery St., Pullman, Wash.
Secretary — E. W. Tollefson, Box 393 College Sta., Pullman, Wash.
Meetings—Bimonthly at Mechanics Art Bldg., Pullman, Wash.

CONTRACTOR-DEALER ASSOCIATIONS

National Association of Electrical Contractors and Dealers
Chairman—W. Creighton Peet.
Secretary—Harry C. Brown, 110 West 4th St., New York.
Executive Committeemen-at-Large—W. D. Kohlwey, California; Executive Committeeman—S. C. Jaggar, Portland.

British Columbia Ass'n Electrical Contractors and Dealers
President—C. H. E. Williams, 509 Richards St., Vancouver, B. C.
Secretary — Capt. W. J. Conway, Vancouver, B. C.
Meetings—First Tuesday of each month.
Annual Meeting, Sept. 13-14, Victoria, B. C.

California Ass'n of Electrical Contractors and Dealers
President—H. C. Reid, 507 Montgomery St., San Francisco.
Secretary—J. W. Redpath, Rialto Bldg., San Francisco.
Meetings—Monthly.

Electrical Contractors and Dealers Ass'n of San Francisco
President—J. M. Carlson, 175 Jessie St., San Francisco.
Secretary—J. W. Asher, 601 Howard St., San Francisco.
Meetings—Monday, 12:15; Jules Sutter Cafe.

Southern California Electrical Contractors and Dealers
President—G. E. Arbogast, 724 So. Olive St., Los Angeles, Cal.
Secretary—J. E. Wilson, 425 Consolidated Realty Bldg., Los Angeles, Cal.
Meetings—Every Friday at 6:30 p.m. at the Pin Ton Cafe, 427 South Broadway.

Monterey Bay Electrical Contractors and Dealers
President—W. Cox, Santa Cruz.
Secretary—J. A. Noggle, Monterey.

Nevada Ass'n of Electrical Contractors and Dealers
President—F. V. McAvoy, 138 N. Canter St., Reno.
Secretary—R. W. Shearer, 215 Sierra St., Reno.
Meetings—Twice a month, 15th and 30th.

Oregon Ass'n of Electrical Contractors and Dealers
President—A. S. Halls, 262 Stark St., Portland.
Secretary—J. Willis Oberender, 301-2 Dekum Bldg., Portland, Ore.
Annual Meeting—Sept. 20, 1918.

Portland Local Ass'n of Electrical Contractors and Dealers
President—J. H. Sroufe, Jaggar-Sroufe Co., Portland.

Utah Society of Electrical Contractors and Dealers
President—J. V. Buckle, Buckle Electrical Co., 70 E. 1st St., Salt Lake City.
Secretary—E. H. Eardley, Eardley Bros. Co., 37 E. 1st St., Salt Lake City.
Meetings—Every Friday noon at Commercial Club.

Washington Ass'n of Electrical Contractors and Dealers
President—V. S. McKenny, NePage & McKenny Co., Armour Bldg., Seattle, Wash.
Secretary—W. D. Alleson, 404 Oriental Bldg., Seattle, Wash.
Meetings—Quarterly—second Thursdays of March, June, September and December.

JOBBERS' ASSOCIATIONS

Electrical Supply Jobbers Association
General Secretary—Franklin Overbagh, 411 So. Clinton St., Chicago, Ill.
Meetings—Semi-annual.

Pacific Coast Electrical Supply Jobbers
President—W. S. Berry, Western Electric Company, San Francisco.
Secretary—Albert H. Elliot, 544 Market St., San Francisco.
Meetings—Quarterly.

Electrical Credit Ass'n of the Pacific Coast
President—C. L. Gilson, Gilson Electrical Supply Co., 304—12th St., Oakland, Cal.
Secretary—Albert H. Elliot, 544 Market St., San Francisco.
Meetings—annually; San Francisco; May.

OF ELECTRICAL INTEREST

National Electric Light Association
President—W. F. Wells, Edison Elec. Illuminating Co., Brooklyn.
Executive Secretary—T. C. Martin, 33 W. 39th St., New York City.

Nevada Section, N. E. L. A.
Chairman—Geo. A. Campbell, Reno, Nev.

Pacific Coast Section, N. E. L. A.
President—Samuel Kahn, Western States Gas & Electric Co., Stockton, Cal.
Secretary—A. H. Halloran, Journal of Electricity, Crossley Bldg., San Francisco.
Meetings—Annually, in April.

Portland Section, N. E. L. A.
Chairman—H. H. Schoolfield, Pacific Power & Light Co., Portland.
Secretary—F. H. Murphy.

Illuminating Engineering Society
President—George A. Hoadley.
Secretary—Clarence L. Law.
Western Representatives—Romaine Myers, Bacon Bldg., Oakland, Cal.; C. M. Masson, Edison Bldg., Los Angeles; F. H. Murphy, Portland Railway Light & Power Company, Portland, Ore.; W. R. Putnam, Utah Power & Light Company, Salt Lake City; Fred A. Osborn, University of Washington, Seattle, Wash.
Meetings—First Tuesday each month.

New Mexico Electrical Association
President—M. R. Buchanan, Silver City, N. M.
Secretary—E. M. Haggerson, Silver City, N. M.
Meetings—Annually, in February.

Southwestern Electric and Gas Association
President—H. C. Morris.
Secretary—H. S. Cooper, 403 Slaughter Bldg., Dallas, Texas.

Northwest Electric Light and Power Ass'n
President—Guy W. Talbot, 1212 Spalding Bldg., Portland, Ore.
Secretary—Geo. L. Myers, 1212 Spalding Bldg., Portland, Ore.
Meetings—Convention held annually. Executive Committee, governing body of Association, meets upon call of its chairman.
Convention at Portland, September 13, 1918.

Los Angeles Jovian Electrical League
President—H. N. Sessions, San Fernando Bldg., Los Angeles.
Secretary—W. C. McWhinney, Southern California Edison Co.
Meetings—Every Wednesday, 12 m.

San Francisco Electrical Development League
President—R. E. Fisher, Pac. Gas & Elec. Co...
Secretary—J. W. Redpath, Rialto Bldg., San Francisco.
Meetings—Every Wednesday, 12:10 p.m.; luncheon, Palace Hotel.

Electric Metermen's Association
President—J. E. Bridges, Westinghouse Electric & Manufacturing Company.
Secretary—A. E. Coney, Great Western Power Company, San Francisco.
Meetings—About every 60 days.

Alameda County Electrical Club
President—George Drew, Pacific States Electric Company, Oakland, Cal.
Secretary—George B. Furniss, Pacific Gas & Electric Company, Oakland, Cal.

Synchronous Club
Secretary—H. N. Beecher, City Hall, L. A.

Telephone and Telegraph Society of the Pacific Coast—San Francisco Section
President—L. S. Hamm, Pacific Tel. & Tel. Co., San Francisco.
Secretary—Chas. H. Dodson, 835 Howard St., San Francisco.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS

National Officers
President—Charles T. Main, Engineering Society Bldg., New York City.
Secretary—Calvin W. Rice, Engineering Society Bldg., New York City.

San Francisco Section, A. S. M. E.
President—E. C. Jones, Pacific Gas & Electric Co., San Francisco.
Secretary—Geo. L. Hurst, Bethlehem Ship Bldg. Corp., Ltd., San Francisco.
Meetings—Quarterly.
Thursday luncheons have been arranged at the Engineers' Club, 57 Post St.
Annual Meeting—September 26th, Engineers' Club.

Los Angeles Section, A. S. M. E.
President—F. G. Pease, Mt. Wilson Solar Observatory, Pasadena, Cal.
Meetings—Quarterly.

ENGINEERS' CLUBS

Oregon Society of Engineers
President—Orrin E. Stanley, Box 973, Portland, Ore.
Secretary—C. J. Hogue, Box 973, Portland, Ore.
Meetings—Annual: Feb. 4, 1918. Monthly: Third Thursday of each month.

The Engineers' Club of Seattle
President—J. F. Pinson, Seattle, Wash.
Secretary—E. J. Bartells, Northern Life Bldg., Seattle, Wash.
Meetings—Thursday noon at the club rooms at 410 Arctic Bldg. A buffet luncheon is served every day. A special welcome is extended to all engineers visiting the city.

Engineers' Club of San Francisco
President—B. P. Legare, 58 Sutter St., San Francisco.
Secretary—J. R. Brownell, 525 Market St., San Francisco.
Annual Meeting: October.

Idaho Society of Engineers
President—W. H. Gibson, Mountain Home, Idaho.
Secretary—Ira F. Shaffner, Boise, Idaho.

Engineers' Club of Oakland
President—R. S. Chew, Oakland Chamber of Commerce, Oakland.

Engineers' Club of Sacramento
President—George S. Nickerson, 914 Forum Bldg., Sacramento.
Secretary—P. M. Noeboe, State Department of Engineering, Forum Bldg., Sacramento.

MISCELLANEOUS

American Ass'n for the Advancement of Science—Pacific Division
President—D. T. MacDougal, Director Desert Laboratory, Carnegie Institution, Tucson, Arizona.
Secretary (acting)—J. R. Douglas, 430 Library, University of California, Berkeley, Cal.
Meetings—Annual.

American Chemical Society—Oregon Section
Secretary—Norman C. Thorne.

Foreign Trade Club
President—W. H. Hammer, Monadnock Bldg.
Secretary—Wm. E. Hague, Monadnock Bldg.
Meetings—238 Merchants Exchange Bldg., San Francisco. Every Wednesday evening.
Sept. 11th—"Trade Relations with Australasia"—John H. Saunders.

Pacific Coast Gas Association
President—John D. Kuster, care Pacific Gas & Electric Co., San Jose, Cal.
Secretary—Henry Bostwick, 445 Sutter St., San Francisco.
Meetings—Annual Next convention—September, 1918, in Los Angeles.

Society for Promotion of Engineering Education
Secretary—F. L. Bishop, University of Pittsburgh, Pittsburgh, Pa.

HAPPENINGS IN THE INDUSTRY

Action on Water Power Bill—

The House has rejected President Wilson's suggestion that the recapture clause of the Administration water-power bill be amended to eliminate the provision for paying the new investment in the event that power projects are taken under federal, state or municipal control at the end of the lease periods. The recommendation of the water-power committee was retained, the House defeating, 96 to 71, a proposal that "fair value" be substituted for "net investment," as urged by the President.

The House went on record as favoring the fifty-year lease period with the Government or any municipality having the right to take over power projects at the expiration of the leasing period upon payment of the net investment.

Further Power Restrictions—

Further restrictions in the use of power by California industries not wholly engaged in the manufacture of war materials will probably be ordered soon, according to Albert E. Schwabacher, Fuel Administrator for California, to whom authority to determine the amount of power to be supplied to lesser industries has been telegraphed by the priority committee of the National Fuel Administration.

All power companies are to be instructed to forward lists of their customers, addresses, class of work performed, amount of power consumed by each and the percentages of war materials made, from which information a preferential list will be compiled, and those industries devoting their entire

efforts to the making of war supplies will have a supply of power assured, according to Schwabacher.

Lightless nights will be enforced throughout the State on Monday and Tuesday only, beginning October 1.

GOVERNMENT TO TRAIN EMPLOYMENT MANAGERS

War Emergency Courses in Employment Management, conducted by the Employment Management Division of the War Industries Board, under the auspices of five governmental departments, have been arranged for in nine universities to date.. These courses in employment are designed to train men or women, who already have a basic experience of at least three years in industrial life and factory methods, and who have come in actual contact with shop problems. Employers of labor, particularly those having war contracts, are urged to suggest men or women from their own organizations as candidates for these courses. With the increasing tightening of the labor situation, it is absolutely essential that large plants have an efficient central employment department. If the Government is to take upon itself the task of furnishing labor when called upon it is necessary that labor be employed in the proper manner. It has been thoroughly proved that an experienced employment manager, in charge of all hiring and firing, comes very near to solving the labor problem.

Courses have been arranged for at the University of Washington, Seattle, and the University of California at Berkeley.

RELATIONS BETWEEN WORKERS AND EMPLOYERS IN WAR INDUSTRY

The following principles to govern the conduct of labor adjustments during the period of the war have been adopted by the National War Labor Board:

There should be no strikes or lockouts during the war.

Right to Organize—

The right of workers to organize in trade-unions and to bargain collectively through chosen representatives is recognized and affirmed. This right shall not be denied, abridged, or interfered with by the employers in any manner whatsoever.

The right of employers to organize in associations or groups and to bargain collectively through chosen representatives is recognized and affirmed. This right shall not be denied, abridged, or interfered with by the workers in any manner whatsoever.

Employers should not discharge workers for membership in trade-unions, nor for legitimate trade-union activities.

The workers, in the exercise of their right to organize, should not use coercive measures of any kind to induce persons to join their organizations nor to induce employers to bargain or deal therewith.

Existing Conditions—

In establishments where union and non-union men and women now work together and the employer meets only with employes or representatives engaged in said establishments, the continuance of such conditions shall not be deemed a grievance. This declaration, however, is not intended in any manner to deny the right or discourage the practice of the formation of labor unions or the joining of the same by the workers in said establishments, as guaranteed in the preceding section, nor to prevent the War Labor Board from urging or any umpire from granting, under the machinery herein provided, improvement of their situation in the matter of wages, hours of labor, or other conditions as shall be found desirable from time to time.

Established safeguards and regulations for the protection of the health and safety of workers shall not be relaxed.

Women in Industry—

If it shall become necessary to employ women on work ordinarily performed by men, they must be allowed equal pay for equal work and must not be allotted tasks disproportionate to their strength.

Hours of Labor—

The basic eight-hour day is recognized as applying in all cases in which existing law requires it. In all other cases the question of hours of labor shall be settled with due regard to governmental necessities and the welfare, health, and proper comfort of the workers.

Maximum Production—

The maximum production of all war industries should be maintained and methods of work and operation on the part of employers or workers which operate to delay or limit production, or which have a tendency to artificially increase the cost thereof, should be discouraged.

Mobilization of Labor—

For the purpose of mobilizing the labor supply with a view to its rapid and effective distribution, a permanent list of the numbers of skilled and other workers available in different parts of the country shall be kept on file by the Department of Labor, the information to be constantly furnished—

1. By the trade-unions.
2. By State employment bureaus and Federal agencies of like character.
3. By the managers and operators of industrial establishments throughout the country.

These agencies shall be given opportunity to aid in the distribution of labor as necessity demands.

Custom of Localities—

In fixing wages, hours, and conditions of labor, regard should always be had to the labor standards, wage scales, and other conditions prevailing in the localities affected.

The Living Wage—

1. The right of all workers, including common laborers, to a living wage is hereby declared.

2. In fixing wages, minimum rates of pay shall be established which will insure the subsistence of the worker and his family in health and reasonable comfort.

ADVISORY FREIGHT COMMITTEE

Shippers in California, Nevada, Utah, Arizona and New Mexico (west of Deming and Albuquerque) are invited to avail themselves of the assistance and information offered by the San Francisco District Freight Traffic Committee of the United States Railroad Administration. W. G. Barnwell, assistant freight traffic manager of the Santa Fe, is chairman, and associated with him are G. W. Luce and H. K. Faye.

"1.—**Aim and Object:** The San Francisco District Freight Traffic Committee is the public's and the railroad's representative of the Administration, appointed for the purpose of alleviating to the fullest extent all difficulties pertaining to rate adjustments, etc., etc. All should avail themselves of its assistance and information; its members are desirous of serving the shipping public in the same manner that other officials appointed by the Administration are doing.

"2.—**Rate Adjustments:** If interested in a freight adjustment, present the subject either in writing or orally, to the railroad official with whom you have been in the habit of doing business, who, in turn, will prepare the necessary details and present your case to the San Francisco District Freight Traffic Committee. This method will save delay and result in the greatest efficiency being attained. Of course, if a shipper prefers, he may present his proposition either orally or by letter direct to the committee.

"3.—**Commercial Traffic Bureaus:** Such bureaus representing shippers or communities should follow the same procedure as outlined above, and it will be helpful to this committee. Every question of rate adjustment can be handled by this committee, which was appointed for that purpose and for the convenience of shippers and communities."

TELEPHONE RULINGS

Curtailment of Extensions—

A recent order of the Postmaster General directs all telephone companies:

1. To confine extensions and betterments to imperative and unavoidable work to meet war requirements and the vital commercial needs of the country.

2. To proceed as expeditiously as possible with the plans heretofore instituted for consolidating and unifying the telephone plants and properties.

3. Whenever two telephone systems are operating in the same area, the managements concerned should cooperate in making extensions and betterments, in order that the elimination of waste may be brought about as expeditiously as possible.

4. This order is not intended to direct any action, course, or policy which in the judgment of the owners of any property involved will result in damage or injury to their business or property.

Telephone Users Pay Costs—

Owing to the necessity for conserving labor and material and to eliminate a cost which is now borne by the permanent user of the telephone, a readiness to serve or installation charge will be made on and after September 1, 1918, for all new installations, also a charge for all changes in location of telephones. Installation charges to be as follows:

Where the rate is $2 a month or less	$ 5
Where the rate is more than $2, but not exceeding $4 a month	10
Where the rate is more than $4 a month	15

The moving charge to the subscriber will be the actual cost of labor and material necessary for making the change.

TRADE NOTES

New Salt Lake Business—

Eardley Bros. Company of Salt Lake City has just completed work on the Deseret Bank Building of that city. It is of complete fireproof construction, with all the electrical installation furnished by Eardley Bros. The conduit wiring system is arranged with the "Krantz" safety panel boards and each office is wired for separate metering. The office portion of this building is illuminated with Brascolites and the banking floor and safety deposit department will be illuminated with fixtures of a special type. The cages will be illuminated with Concealite fixtures in bronze as manufactured by the St. Louis Brass Company. Among other developments Eardley Bros. are furnishing the electrification of the Utah Oil Refining Company's plant, furnishing a complete wiring system including a 100 kva., 4400 to 220 volt transformer station. The electrification of the Utah Sulphur Company project at Cove Fort in central Utah is also being cared for, consisting of a 100 kva.,44000 to 440 volt sub-station, complete with motor generator sets for operating 250 volt Jeffry mine locomotives. There is a 75 h.p. Marion electric shovel, and 440 volt three-phase motors for operating the filtration plant.

A New Company—

Among the firms recently organized at Seattle is that of Thompson & Castleton, Inc., which opened for business August 15th with offices and shop at 316 First Avenue South. The company handles electrical, mining and hydraulic machinery, also buys, sells and exchanges both new and used machinery. In connection with their plant there is an extensive repair department and they are specializing on installations of power equipment. R. W. Thompson, one of the members of the new firm, was formerly vice-president and superintendent of A. H. Cox & Company, Seattle, but disposed of his interests in that company on April 1st of this year. Mr. Thompson as the firm's representative is acting as electrical engineer for the Puget Sound Bridge & Dredging Company, a Seattle firm, in connection with its sluicing department, and for Twohy Brothers in the erection of the dam on the Ochoco Irrigation Project in Oregon. W. A. Castleton, the other member of the company, is a mining engineer and recently disposed of his mining properties in Montana, having interests at Helena and Butte. Business has already assumed considerable proportions.

A Washington Office—

The Cutler-Hammer Manufacturing Company of Milwaukee, manufacturers of electric controlling devices and allied apparatus, announces the opening, on September 3rd, of a branch office in the Union Trust Building, 15th and H streets, N. W., Washington, D. C. Messrs. H. W. Knowles and C. W. Yerger, engineers, who are intimately familiar with the company's products, will be located at this new office. It will be operated entirely for the purpose of giving service to the Government and others having occasion to require information regarding the company's products, orders, contracts, etc.

INEFFICIENT ELECTRIC LAMPS TO BE ELIMINATED

A plan to save electricity and thereby to save fuel by the elimination of inefficient incandescent lamps has been adopted by the United States Fuel Administration, to become effective September 15, 1918.

The plan contemplates the gradual elimination, except in a few rare instances, of the inefficient types of incandescent lamps and the substitution therefor of the more efficient tungsten lamps. The fully developed plan of the Administration is shown in the report of the proceedings of the Committee of Incandescent Lamp Manufacturers, from which extracts are given:

Conservation Program—

1. The elimination of unnecessary types of standard carbon lamps and of carbon lamp types for special applications as follows:

> The standard 60 watt multiple carbon lamp, 100-130 volt range.
> The standard 20 watt S-14 bulb multiple carbon lamp, 100-130 volt range.
> The 120 watt standard multiple carbon lamp, 100-130 volt range.
> The complete elimination of standard 30 watt and 60 watt round bulb multiple carbon lamps, and all other types of 100-130 volt range multiple carbon lamps with standard base used for decorative purposes.

2. The complete abandonment by central station companies of the installation and renewal of carbon incandescent lamps of all sizes and discouragement of their use by their consumers and the public for any use or application for which tungsten lamps can be substituted; this policy to go into full effect not later than September 15, 1918.

3. The gradual abandonment of the installation and renewal of metallized filament (GEM) lamps of all sizes by the central station companies and discouragement of their use by their consumers and the public for any use or application for which tungsten lamps can be substituted.

Under special and unusual conditions where it is absolutely necessary to use lamps with exceptionally robust filaments owing to rough handling or excessive vibration, the use of carbon lamps is recommended so that the metallized filament (GEM) type may be completely eliminated. This policy to go into full effect not later than November 15, 1918.

4. It is recommended that the use of considerable numbers of the smaller sizes of lamps for commercial and industrial applications be eliminated where it is practicable to substitute for them large single gas filled lamps of highest efficiency in a smaller number of lighting units.

5. It is recommended that the use of vacuum tungsten lamps in sizes of 100 watts and over be eliminated and whenever practicable gas filled tungsten lamps of highest efficiency substituted therefor.

6. It is recommended that electric light and power companies employ no differentials in their price schedules for the sale or renewal of lamps which may tend to encourage the use of larger sizes of lamps rather than smaller sizes, except as such differentials are justified by differences in the cost of the service.

7. It is recommended that all manufacturers of carbon and metallized filament (GEM) lamps insert with each standard package of such lamps shipped by them a printed notice directing the attention of the user of the lamps to the fact that the particular lamps in the package should be used only in locations where it would be impracticable, because of excessive vibration and rough handling or for therapeutic and heating purposes, to use satisfactorily a more efficient type of lamp.

It is recommended that the manufacturers use the following standard form for such notice:

> Complying with the request of the U. S. Fuel Administration, you are asked not to use, or advise the use of, the lamps in this package in such locations and under such service conditions where a more efficient type of lamp would be satisfactory.
>
> Signed.....
> Manufacturer's Name.

8. It is recommended that when the U. S. Fuel Administration promulgates these regulations it should call the attention thereto of the Public Service Commissions and other regulatory bodies, state and municipal, and should urge that where a public service corporation in order to comply with the terms thereof has the cost of lamp renewal service under the contracts with its customers substantially increased thereby, the public service corporation be permitted either to collect from its customers so affected the increase in the cost of the lamp renewal service or discontinue the furnishing of free lamp renewal service and, where practicable under present conditions, make therefor an appropriate adjustment.

9. It is recommended that the central station companies be requested to urge upon their customers and the general public in the advertising in the daily press, company house organs and in all promotion literature the importance of selecting lamps of sizes which do not provide an amount of illumination beyond what is strictly necessary, the exercise of due care in extinguishing all lamps which are not needed and the elimination of all extravagant and wasteful use of light, as a measure of fuel conservation.

10. It is recommended that a pronouncement be prepared and submitted for the approval of the U. S. Fuel Administration to be distributed to all of the electric light and power companies of the United States, through the facilities offered by the National Committee on Gas and Electric Service, calling attention to the urgent necessity of fuel conservation and inviting the cooperation of all users of electricity, for light and power purposes, to a full compliance with the conservation program as finally approved.

It is recommended that in the promulgation of the program by the United States Fuel Administration the cooperation of the manufacturers, electrical supply dealers and electrical jobbers be invited in order to secure the widest possible publicity for the conservation measures proposed, reaching in these several ways every class of lamp user through all of the production and distribution channels.

11. It is recommended that the U. S. Fuel Administration communicate the program as finally adopted to the various Government Departments, making extensive use of incandescent electric lamps such as the Shipbuilding Board, Army, Navy, Treasury Department, etc., and invite their cooperation in conforming with the program to the largest practicable extent.

General Considerations—

It is considered impracticable to make a broad recommendation in regard to the elimination or restriction in the use of 40, 50 or 60 watt tungsten lamps, and the substitution therefore of 10, 15 or 25 watt tungsten lamps. The conditions surrounding the use of these lamps, the locations where installed, the type of fixture and glassware used, and the necessity for adequate illumination either for industrial processes to secure maximum production, or in the home to avoid the glare from naked lamps or the eye strain that would result from insufficient illumination, make it difficult to recommend the general substitution of lamps of the smaller sizes for the larger size lamps.

The purpose of the program would, in a measure, be defeated and an objectionable condition created if the substitution of types would result, for instance, in the use of two 25 watt lamps where formerly a single 40, 50, or 60 watt lamp was used. In considering a more general use of 10 and 15 watt tungsten lamps the increased use of the raw materials required for their manufacture, such as bulbs, brass bases, etc., must be considered. It would also be pointed out that tungsten lamps of the smaller sizes have filaments which are less robust than those in the larger sizes and their life is consequently shorter. Attention is also called to the fact that the efficiency of the smaller sizes of tungsten lamps is considerably less than the efficiency of the larger lamps.

Consideration must also be given to the importance of providing adequate illumination in manufacturing and industrial plants engaged on war industries, so as to secure the maximum production now demanded of them. It is the universal experience that a relatively small increase in illumination, affecting the fuel consumed to a very slight extent, results in a comparatively large improvement in both the quality and quantity of the output. It is therefore necessary to proceed with caution in advising any restriction of illumination in industrial plants engaged on war industries. On the other hand there are many locations and conditions, particularly in the household, where the larger sizes of lamps are now being used and where smaller lamps would no doubt give adequate illumination.

Where a utility company as a part of its lamp renewal policy supplies tungsten lamps of both large and small sizes, it is recommended that the difference in the renewal of sale prices between the large and small sizes be based on the actual difference in the cost to the company of the service in each case and that no attempt be made to influence the use of the larger sizes of lamps by the consumers or the public through the establishment of a price differential that is not justified by the respective service costs.

By the abandonment of the types as proposed in Article 1 such carbon lamps as it might still be necessary to use under the special conditions outlined would be of the next smaller sizes.

It is desirable to secure the complete elimination of the metallized filament (GEM) type of lamps even though the substitution for them of carbon filament lamps in the few exceptional cases where it becomes absolutely necessary to use particularly rugged filaments may result in an apparently increased energy consumption.

In order to secure the most complete elimination possible of the inefficient carbon and GEM lamps of all sizes it is recommended that where consumers specifically request lamps of these types from central stations or lamp dealers, their attention be called in each case to the recommendations of the Fuel Administration as outlined in the program and every effort be made to discourage the use of inefficient lamps by the public.

Many of these problems would be solved and a complete and almost universal substitute for carbon and GEM lamps be provided if tungsten filament were available very much more robust than the present product. It is understood that manufacturers are now very actively at work on this problem and the outlook for its solution seems very hopeful.

Attention is also called at this time to the importance of the proper rating and labeling of lamps by the manufacturers so that the consumption of energy does not exceed the limits provided for in the Government specifications.

The change in production of lamps from the manufacturing standpoint necessary to meet the program above outlined does not present insuperable difficulties, but will inevitably result in some interference with the business of certain manufacturers producing, wholly or in part, lamps of the types it is proposed to eliminate or the use of which is to be discouraged. It is believed that an agreement may be had with the larger manufacturers whose principal business is the production of tungsten lamps that they may abandon their output of carbon lamps, and transfer of the production of carbon lamps may possibly be arranged under a mutual agreement made through the administrative authorities at Washington between the larger manufacturing companies and the smaller businesses now producing carbon lamps. This phase of the question presents some legal, as well as industrial aspects which can no doubt be satisfactorily adjusted at a conference in Washington between the administrative authorities and the representatives of the parties in interest.

LATEST IN EVERYTHING ELECTRICAL

(The whole question of the conservation and the efficient use of fuel oil is a live one throughout the West and the report of a new burner is of particular interest. The possibilities of steel conservation in its substitution of materials is pointed out by the conduit manufacturers. An automatic rack for soldering irons and an illuminated fuse tester are further described below.—The Editor.)

AN ILLUMINATED FUSE TESTER

Unless some form of tester (usually crude and home made) is available, it is at present common practice to replace with new fuses all the fuses of a cut-out box in which one fuse has blown, waiting for a future opportunity to make a test to detect the blown fuse or fuses, and to replace in stock the fuses which have not operated. Not only does this method unnecessarily consume time, but it requires a stock of fuses fully double that which answers the purpose where tests for operative fuses are made at the cut-out boxes.

An illuminated fuse tester

An appliance designed to do away with waste of time and money to discover a blown fuse is announced, and is being marketed by R. S. Blake, 230 So. LeSalle street, Chicago, Ill.

Essentially, it consists of a device to test fuses in place, with safety, while the back of the fuse is illuminated by the light from a dry cell flash lamp. The tester is held in one hand, the light flashed on, and the necessary contacts are made by means of the two contact points shown in the illustration—one a stiff heavy rubber insulated wire, and the other a rubber insulated flexible wire. The result of the test is immediately apparent by the lighting or remaining dark of the two test lamps arranged in series.

At present, the electrician who has equipped himself with a couple of sockets in series for testing fuses, needs a helper to hold the light, where the cut-out is in a dark spot, as is so often the case in many industrial plants, theatres, hotels, or on board ship, in mines, etc. With the above described combination of tester lamp and flash lamp it is entirely possible for even a one-armed man to make the proper tests.

The sockets in the Blake Fuse Tester are standard Edison Base sockets, and any standard lamp may be used in them. Any voltage up to 500 may be tested. In making tests on 500 volts, it is necessary to use two 220-volt lamps. In making tests on 110-220 volt circuits two 110-volt lamps are used.

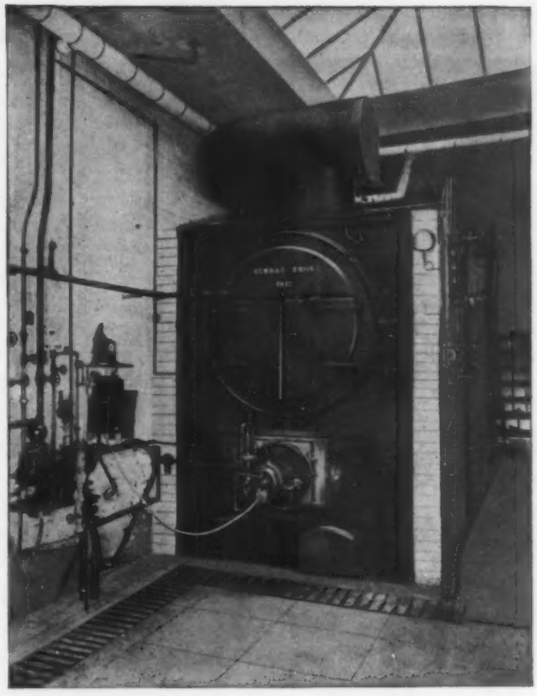
The device is practically indestructible and is marketed with or without the flash light, thus if the electrician is provided with his own lamp, only the tester proper need be purchased.

SUCCESSFUL BURNER FOR FUEL OIL

In order to prevent a recurrence of the fuel conditions of the past winter, much study is being given to the fuel situation.

That fuel oil has not had a wider use has been due largely to the types of burners which have been developed, many of which have not been practical for general use. To be successful, such a device must be simple. For all practical applications the burner should require no adjustments after installation, and should operate over long periods of time without attention. When properly installed a successful burner carries a very low fire hazard.

To burn fuel oil, it must be perfectly atomized, and at the same time sufficient air must be introduced to get thorough combustion. Steam and air atomization, while successful, are not entirely satisfactory for a number of reasons, chief of which is the waste of oil, which cannot be countenanced, particularly under present conditions. Air atomization requires too much complicated machinery to obtain the desired results. Steam is not always available and is only feasible for high-pressure work. Therefore, in order to make the burning of fuel oil both popular and profitable, the need has been for a mechanical atomizing burner with high efficiency, low upkeep and small initial cost.



Installation With 150 h.p. Boiler in Gimbal Candy Factory

W. S. Ray, of San Francisco, has devised a method of atomizing oil in an open cup, lying horizontally, driven at 3450 revolutions per minute, and then forcing air at high velocity around the cup and in a direction away from the cup. In this method he not only introduces sufficient air for proper compression but also enough to direct the fire into the fire-box. Naturally, the air leaving the blower would be turning in the same direction as the atomizer, causing the fire to be unsteady, and having a tendency to throw oil on all sides of the fire-box, but this the inventor overcomes by inserting guide vanes in a nozzle surrounding the atomizer, which direct the air from a revolving to a straight path.

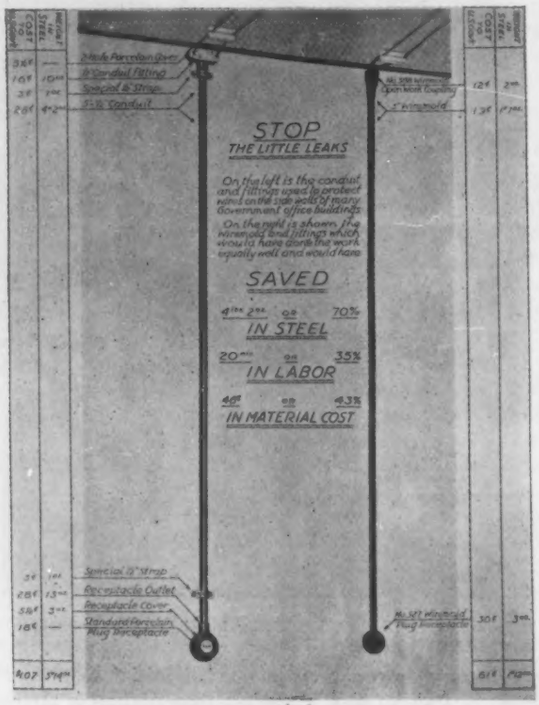
The Ray Oil Burner has been standardized with a Westinghouse enclosed motor. The hollow shaft of this motor has been extended to permit the worm gear to be fastened to the center of the shaft, and the blower and atomizer are attached to the end opposite the motor. This permits the centering of the bearing on the shaft. A Hess Bright ball-bearing is used at each side of the worm gear. This worm gear is encased in a housing which is constructed with an oil well at the base. This gives the two bearings a splash feed which is positive and removes the danger of either under-oiling or of over-oiling.

With the exception of domestic stoves, fuel oil as low as 14 gravity can be burned successfully without smoke, soot or dirt, in all types of fire boxes, where high heat is needed. In California, with coal at $8.00 per ton, and fuel oil at $1.50 per barrel of 42 gallons, a saving of approximately 50% over coal may be obtained with this burner, on the basis that coal has 14,000 B.t.u. per pound, as against oil at 18,500 B.t.u. per pound, and assuming that the coal is perfectly fired. Usually at least 25% of the heat units are not obtained from the coal on account of imperfect firing which causes incomplete combustion.

The Ray Oil Burner is very flexible in its application and can be used in anything from a hot-air furnace in a private residence to a 500 h.p. boiler installation.

STEEL CONSERVATION

The necessity for conserving steel has led the American Conduit Manufacturing Company to point out the advantages of their Wiremold product over the other conduit material produced by their factories.


STOP
THE LITTLE LEAKS
On the left is the conduit and fittings used to protect wires on the side walls of many Government office buildings
On the right is shown the Wiremold and fittings which would have done the work equally well and would have
SAVED
70%
IN STEEL
35%
IN LABOR
43%
IN MATERIAL COST

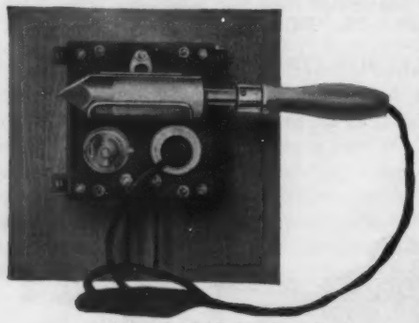
The Saving in Steel by the Use of Molding

This picture illustrates the waste in steel, in labor and in money represented by the conduit housing used to protect wires on sidewalls in the several temporary office buildings at 7th and B Sts., Washington.

Accurate data as to the exact number of these housings is not at hand but at a close estimate they represent a waste in steel of some 15 to 20 tons in this particular group of buildings alone and when extended to cover cantonments, hospitals and similar Government enterprises, mount to a rather staggering total, since the lighter product—Wiremold—serves equally well in the class of construction required for such buildings.

NEW AUTOMATIC RACK FOR SUPPORTING AND PROTECTING ELECTRIC SOLDERING IRONS

Electric soldering irons which are left to lay on a bench or other convenient place when temporarily not in use, gather dirt and become a hazard. Often the tip will be over-heated, necessitating refiling; the heating unit may burn out; or the hot iron set fire to the bench or other material. If the current is turned "off" the iron cools down to such a degree that considerable delay is caused when the iron is again wanted.



Automatic Soldering Iron Rack

To overcome these objectionable features The Cutler-Hammer Mfg. Co. of Milwaukee and New York has recently developed an automatic soldering iron rack and control panel which decreases the amount of current taken by the iron when it is placed on the rack. This keeps the iron from overheating, prevents burnouts, and saves current and further encourages orderliness by providing a convenient connection point and support for the iron. The rack consists of a small slate panel arranged for wall mounting and carrying a support for the iron which acts on the principle of the telephone receiver hook. When the iron rests on the support or hook it bears the support down and resistance which is mounted on the back of the panel is inserted in circuit with the iron. The current is reduced and the temperature held at a safe value, but ready for service and full current just as soon as the iron is lifted from the hook. Taking the weight from the hook disconnects the resistance from the soldering iron circuit and allows full current to flow. Below the hook, on the same panel, there is a push button snap switch and a "Standard" receptacle to which the plug of the soldering iron cord is connected. This little panel, therefore, is a complete switchboard which may be mounted on the wall or machine within reach of the workman. When not in use and at night, the switch is snapped "off" which completely opens the circuit to the iron.

These automatic racks are designed for use with C-H Soldering Irons but may be used with other similar types as well.

SPECIAL COURSES IN FIRE PROTECTION ENGINEERING PRACTICE

Armour Institute of Technology established in 1903 a four-year course in Fire Protection Engineering. There have been numerous requests for the establishment of courses of shorter duration, not leading to the degree of Bachelor of Science, but designed to meet the needs of young men not in a position to devote four years to a regular college course, or of men of more mature years with some experience in fire protection, who desire additional training of an intensive character. Hitherto it has seemed unwise to offer such special courses. At the beginning of this school year, September 9, 1918, however, two special courses in Fire Protection Engineering were inaugurated, one course extending throughout one semester, and the other throughout the school year. The courses will include lecture and classroom work and experimental work at the plant of the Underwriters' Laboratories, Chicago. The longer course will include also a series of field inspections and special discussion of report writing.

BOOKS AND BULLETINS

Reflectors for Inside or Outside Lighting

Lighting suggestions are the feature of a recent folder published by the Reynolds Electric Company with the purpose of illustrating how Reco Reflectors are suitable for lighting buildings, trenches, yards, subways, interiors and exteriors wherever concentrated lighting is required.

Research Papers

"The Storage of Bituminous Coal" by H. H. Stock is the subject of an extensive bulletin recently issued by the University of Illinois Engineering Experiment Station. Tables, charts and illustrations add to the value of the treatise.

A. E. Kennelly and P. L. Alger of the Research Division of the Electrical Engineering Department of the Massachusetts Institute of Technology are the authors of a paper on "Magnetic Flux Distribution in Annular Steel Laminae," published in pamphlet form from the transactions of the A. I. E. E.

New Bulletins

A new Condulet Bulletin, No. 1000 H, published by the Crouse Hinds Company, records a further development of the Condulet line. The pamphlet is well illustrated and is being sent out to the trade on request.

Francke flexible couplings of the heavy pattern type are featured in bulletin No. 26 sent out by the Smith Serrell Company, Inc., general sales agents for the Francke Company, including new price list data and order blanks.

The Rego line of welding and cutting apparatus, lead burning equipment and regulators is featured in an attractive loose leaf binder issued by the Bastian-Blessig Company, the manufacturers of the line. The elimination of the flashback in oxy-acetylene torches is particularly emphasized.

Annual Report

The annual report of the Westinghouse Electric and Manufacturing Company includes a financial statement of the company and its proprietary holdings in the United States, as well as an indication of some of the munitions work which is being undertaken by some of their factories.

1917 Lumber Production

A total computed lumber cut for the United States in 1917 of 35,831,239,000 feet is announced by the Forest Service in a bulletin recently sent out. This figure is based on reports received up to May 15, from 16,408 sawmills out of the 24,815 believed to have operated last year. It is estimated that the actual cut in 1917, on the basis of compiled figures, was approximately 10 per cent less than the production in 1915.

The falling off in lumber production during the past year is attributed principally to largely decreased private building operations, the scarcity of labor in connection with small operations, transportation difficulties, curtailment of demand on the part of wood-using industries, and a more or less general dislocation of lumber distribution through ordinary channels of trade. A considerable portion of the total quantity produced was utilized in meeting the exceptional demands for Government construction and other war emergency projects, including ship material.

Electricity in the Cane Sugar Industry

The General Electric Company has prepared for distribution Bulletin No. 48024 entitled "Electricity in the Cane Sugar Industry" describing the advantages derived from the application of electrical apparatus in cane sugar mills and showing how the use of electricity has produced definite savings in the cost of labor, fuel, supplies and repairs. The savings given are based on authentic data and government cost figures.

This bulletin contains many interesting and instructive illustrations of G-E installations in Cuba, Porto Rico, Mexico and other cane growing countries.

The Y. M. C. A. and War Industries

The report of a conference on the human aspects of war industries and the Y. M. C. A.'s relation to the problems involved is included in literature being sent out in preparation for the coming Y. M. C. A. drive in October. Among the speakers were such important men as Judge E. H. Gary of a large steel corporation; A. C. Bedford, Chairman Board of Directors of the Standard Oil Company; John J. Eagan, Chairman Board of Directors, American Cast Iron Pipe Company, and others.

The Association is making an effort to place its work for men and boys in the war industries on a basis comparable to its great service to enlisted men.

Instruments Used in Radiometry

A new publication of the Bureau of Standards, Scientific Paper No. 319, entitled "Instruments and Methods Used in Radiometry, III" has recently been issued. The present paper deals with the application of certain physical and chemical properties of matter as a means of quantitatively measuring radiant energy.

Three types of selective radiometers are discussed, viz., the photoelectric cell of potassium and other alkali metals, the selenium cell, and the photographic plates.

The photoelectric cell appears to meet the requirements of a quantitative radiometer and may be used for measuring ratios of intensities extending from the blue throughout the ultra violet part of the spectrum. The selenium cell does not fulfill the requirements of a quantitative radiometer. Quantitative data can be obtained with the photographic plate, but this method can be replaced by the photoelectric cell.

A Paper Weight

An illuminated paper weight has recently been sent out to important officials and heads of departments of electrical enterprises by the Bates Expanded Steel Truss Company. This company are the manufacturers of one-piece steel poles for electric service and the paper weight attractively serves to advertise this fact.

War Time Control of Industry

by Howard L. Gray, Professor of History in Bryn Mawr College; size 5x8 in.; 370 pp.; published by The Macmillan Company, New York, and for sale by the Technical Book Shop, San Francisco. Price $1.75.

This book on the subject of war time control of industry, dealing particularly with the experience of England, was published in December of 1917 and is of necessity incomplete in its handling of a problem which is so rapidly developing. The subject matter, however, is of such vital importance in the light of American developments that the book fills an important need in current literature. The question is handled largely from the standpoint of British experience with brief parallels drawn from the practice in the United States to that date. Although the isolated position of England from the standpoint of food production and the difference of the public attitude toward government control make the situation a different one for the two countries, yet the United States has already profited greatly from the experience of her ally and will undoubtedly base her actions for the future largely upon the lessons she may learn from abroad. The control of railways, munitions and labor, the coal mines, wool and woolens, hides and leather, shipping, food and agriculture are particularly considered in the light of our own problems. A part of the information here included was gathered for the Commercial Economy Board of the Council of National Defense, but this material is not easy of access—and the book should prove a valuable one for ready reference.

NEW ELECTRICAL DEVELOPMENTS

(The interconnection of minor power systems and general extensions of service mark the situation in the Northwest. Two proposed developments are recorded on the Feather River. In the Pacific Southwest region, activity is shown in industrial applications of electrical energy. Mines and irrigation projects are helping to increase the load in the Intermountain district—and a number of wiring contracts are reported.—The Editor.)

THE PACIFIC NORTHWEST

SQUAMISH, B. C.—Work will commence in the near future on a hydroelectric plant for the provincial government Department of Railways.

SPOKANE, WASH.—All passenger fares on the interurban trains of the Washington Water Power Company, of Spokane, have been advanced to a basis of three cents a mile.

PRINCE RUPERT, B. C.—The Prince Rupert Hydroelectric Company is contemplating the construction of a hydroelectric plant, to cost about $100,000. P. Lorenzen is engineer.

OLNEY, ORE.—The application of John Ryan of Olney for appropriation of water rights in the Clatskanie river sufficient to develop about 300 h.p. has been approved by State Engineer Lewis.

USK, WASH.—Mountain State Power Company will construct a power line 20 miles in length, from Usk to Chewelah, Wash. The line is necessary to supply Chewelah with water, estimated to cost $90,000.

BREMERTON, WASH.—An ordinance has been passed by the city council specifying and adopting a plan for building or purchasing an electric light and power plant and system, estimated to cost $200,000.

PORTLAND ORE.—The Jaeger-Sroufe Company, contracting electrical engineers, 103 West Park street, recently closed a contract with the Pacific Marine Iron Works for electric wiring in a number of vessels.

SEATTLE, WASH.—The Hendricks Manufacturing Company, First Ave. South and Horton Street, is making preparations to install a 15-ton electric crane which will operate for a distance of 135 feet through its machine shop.

EUGENE, ORE.—The city council recently passsed an ordinance granting to the Pacific Telephone & Telegraph Company a 25-year franchise to maintain and operate a telephone system in the city. Wires in the business section are to be placed underground.

SEATTLE, WASH.—The contract for the construction of the new wireless plant of the Kilbourne & Clarke Manufacturing Company of Seattle has been awarded to Fred Woodman of this city. Bids will soon be asked for electrical work, heating and plumbing.

TACOMA, WASH.—Dean Landes of the University of Washington is making a survey of geological formation at Lake Cushman to locate difficulties in developing the power site which the city proposes buying from the Skokomish Power Company for $300,000.

PORTLAND, ORE.—Three carloads of steel rails arrived in Portland Tuesday to be used in the construction of a spur from the lines of the Spokane, Portland & Seattle railway to the tract of land recently purchased as the site for a plant by the Pacific Coast Steel Company.

TACOMA, WASH.—Steps are being taken by the Mayor and City Council for the acquirement of the Lake Cushman power site, to provide for the future needs of the city's industrial and residential development. No immediate development of the power site is contemplated.

SEATTLE, WASH.—The Capital Issues Committee has demanded that the plants of the city and the Puget Sound Traction, Light & Power Company be connected so that surplus power of either plant could be used, which the officials of both the city and company have agreed to.

PORTLAND, ORE.—Differences over the proposed franchise of the Kenton Traction Company for use of the Derby street approach to the Interstate Bridge as a right-of-way for its Peninsula traction lines have been settled and and final action will be taken by the county commissioners.

HOQUIAM, WASH.—Improvements are being made to the plant of the Gray's Harbor Lumber Company, including an addition to the power house. New equipment, including a 750-kw. and 1000-kw. turbine and two high pressure boilers, will be installed. The sawmill will be equipped for electrical operation throughout.

DAVENPORT, WASH.—The Intermountain Power Company has filed application for a franchise to construct and operate along the county road in Lincoln county, outside of the city or town, all necessary poles, wires, etc., for the transmission and distribution of electric power for heat, light and electric power purposes, together with the right to maintain wires for telephone purposes.

SEATTLE, WASH.—The city will ask the Capital Issues Commission for permission to issue $150,000 in bonds to extend the municipal railway on East Marginal Way from Spokane avenue to the city limits. An issue of $1,200,000 utility bonds to extend the municipal railway from the northern city limits via Tenth avenue N. E. to connect with the elevated and the Lake Burien line, is asked for in an ordinance.

VALE, ORE.—Under the direction of Chief Engineer C. Soderlund many improvements are being made at the National Nitrate Company's new plant in Vale. The new plant will probably be in operation in about thirty days and will consist of complete reducing and mixing machinery to prepare the materials mined from the company's holdings near Vale for the market in the shape of commercial fertilizer and high grade nitrate chemicals.

SEATTLE, WASH.—The Puget Sound Traction, Light & Power Company has inaugurated a one-man car service on two new routes in Seattle, one from Columbia street over the West Queen Anne and Kinnear lines to Second Avenue, West, and the other on the Broadway line, from Union to Prospect street, a duplication of the Capitol Hill service now being given. These cars will operate throughout the day and will be in addition to the present heavy cars.

SEATTLE, WASH.—Favorable action has been taken by the finance committee of the city council toward beginning work on the Skagit power project. City Engineer Arthur H. Dimock is to proceed with the survey of the project and work is to start in the near future. The first issue of bonds totaling $1,500,000 will be available November 15th and in the meantime it is expected that the necessary funds for the preliminary work will be secured by borrowing from the general fund.

SEATTLE, WASH.—Action was taken by the finance committee of the council in instructing City Engineer A. H. Dimock to proceed with the survey of the Skagit river power project, with a view to the immediate beginning of construction work on the big project. The first issue of bonds for the work, totaling $1,500,000, will be available November 15th, and in the meantime it is expected that the necessary funds for the preliminary work will be secured by borrowing from the general fund, the money to be returned after the bonds have been sold.

THE PACIFIC CENTRAL DISTRICT

FRESNO, CAL.—The California Associated Raisin Company is planning to erect an electric power plant at its works at East and California Avenues.

FRESNO, CAL.—Rosenberg Brothers are contemplating the construction of a power plant at their fruit-packing plant on Cherry Avenue, to cost about $10,000.

ANGELS CAMP, CAL.—Angels Camp Deep Mining Company has recently completed the work of changing the motive power at its plant from steam to electricity.

FRESNO, CAL.—Permission has been granted to the San Joaquin Light & Power Corporation to issue $113,000 in bonds, the proceeds to be used for extensions and improvements to its system.

SAN FRANCISCO, CAL.—A contract has recently been awarded to the General Electric Company by the Board of Public Works for new electric storage locomotives for use at the hydroelectric system at Hetch Hetchy, at $39,162.

SAN FRANCISCO, CAL.—The Great Western Power Company is said to be negotiating for the construction of a large hydroelectric plant near Oroville. It is understood that the plant will cost in excess of $3,000,000 and will be financed by the Government.

YUBA CITY, CAL.—That the city trustees of Yuba City desire to have the Sacramento-Northern Electric Railroad Company pave the strip along Second street over which the tracks, just recently abandoned by the company, pass, was the concensus of opinion at a special meeting called for that purpose.

MODESTO, CAL.—Construction of the 33,000,000 Don Pedro project for the Modesto and Turlock irrigation districts has been made certain by the test borings on the site for the proposed Don Pedro dam and reservoir, which the forthcoming report of the engineers foreshadows. The wells are already down 200 feet.

SAN FRANCISCO, CAL.—Southern Sierra Power Company and the Holton Power Company, an affiliated organization, have made application to the State Railroad Commission for permission to increase their rates for service. The increases are asked to provide for the installation of new hydroelectric facilities to meet increased operating expenses, etc.

CHICO, CAL.—Definite decision to build a 4000-acre irrigation system on the Phelan ranch, at a cost of from $55,000 to $60,000, has been announced. The pumping plants will be comprised of three 24-inch pumps, operated by electric power and installed at the mouth of Chico creek, at which point the water will be lifted out of the Sacramento river.

SAN DIEGO, CAL.—The San Diego Consolidated Gas & Electric Company during the week ended August 23 sold to the Southern California Edison Company of Los Angeles nearly half a million kilowatt hours of electrical energy, transmitting it over the line completed early in the summer for the exchange of electrical power between these two companies.

SAN FRANCISCO, CAL.—Earnings of the Pacific Gas & Electric Company during the month of July gained over July of last year, according to the income statement just issued. For the seven-month period the net fell slightly below the corresponding period of last year. For the year the net income fell $600,000 below the twelve months ending July, 1917.

SACRAMENTO, CAL.—Sacramento is to get a reduction in price for all street lights that are turned off during the months of August and September, while there is a shortage of electric energy, according to a letter from John A. Britton, Vice-President of the Pacific Gas & Electric Company, received by City Commissioner of Public Works Thos. H. Coulter.

LODI, CAL.—To comply with a request by the War Industries Board, the trustees of Lodi authorized President Black to sign a pledge promising not to use any more wire products than is absolutely necessary, as a war saving on material. This action means that there will be no more electroliers installed at this time.

STOCKTON, CAL.—Western States Gas & Electric Company is constructing a dam at Twin Lakes to impound 1000 acre feet of water. The company's output of electrical energy for the Stockton division during the week ended June 28 was 28.3 per cent greater than for the corresponding week last year, and there was an increase of 59 per cent in gas output for the same period.

SAN FRANCISCO, CAL.—A new electrical power plant, developing 25,000 theoretical horsepower, is to be established on the Middle Fork of the Feather river, Plumas county, by K. E. Enslow, of San Francisco, Richard Day and Adams Pipe Works, of Los Angeles, who propose to store 50,000 acre feet in Gold Lake and Grizzly valley, Sierra county, according to applications for water rights to the State Water Commission. The same people have applied for 250 cubic feet a second of the waters of the Middle Fork of the Feather river for the irrigation of 85,320 acres. The main canal will be twenty miles in length. Sixty thousand acre feet a year will be stored in Gold Lake. The works will cost $50,000.

THE PACIFIC SOUTHWEST

FULLERTON, CAL.—Work on the new home of the Pacific Telephone and Telegraph Company has started.

OAKDALE, CAL.—The Waterford Irrigation District is considering a bond issue for $150,000 to provide for the installation of two large new pumping plants to be electrically operated.

LOS ANGELES, CAL.—The Southern California Edison Company has had plans prepared for the construction of a one-story brick station, about 60 by 100 feet, to be located at Myrtle and Walnut avenues, Monrovia.

ARCADIA, CAL.—Extensive electrical work will be required in connection with the development of the new balloon school site by the United States Government, including the installation of new electric-lighting systems, etc.

LOS ANGELES, CAL.—The Pacific Electric Railway Company will build a one-story brick substation, about 32 by 50 feet, at Slauson and Long Beach avenues. The company is also planning for extensions in its system to Yucaipa.

FILLMORE, CAL.—In connection with extensive improvements and additions to the local plant of the Ventura Refining Company, estimated to cost in the neighborhood of $100,000, a large new electrically-operated pumping plant is planned.

LOS ANGELES, CAL.—In conference with the public service department officials, the city council has approved plans for financing the early construction of city power plant No. 2 in the San Francisquito Canyon, which it is estimated will cost $1,100,000.

LOS ANGELES, CAL.—Work is under way in constructing the 8-in. pipe line which the Southern Counties Gas Company is building from Long Beach to Terminal Island. The new line involves the laying of 33,000 feet of pipe and will supply the ship building plant as well as the island.

SAN FERNANDO, CAL.—In connection with the construction of the proposed new plant of the San Fernando Canning Company, a large boiler works will be erected. Immediately upon completion of the structure, electric motors and boilers will be installed. The equipment for the plant is estimated to cost $45,000.

LOS ANGELES, CAL.—Wilbur O. Lusk is considering plans for the construction of a large hydroelectric plant near

Round Mountain for the development of about 7500 kilowatts. Application has been made to the Water Commission for 250 cubic feet per second of the Pit river, Montgomery creek, and Hatchet creek in Shasta county for this purpose.

LOS ANGELES, CAL.—The Union Oil Company of California has awarded a contract for the construction of a one-story brick, steel and reinforced concrete boiler plant, about 60 by 70 feet in size, to be located at its plant at Wilmington. The Davidson Construction Company, Sixteenth and Tennessee streets, Los Angeles, is the contractor.

LOS ANGELES, CAL.—The Southern California Edison Company has been granted a franchise by the County Board of Supervisors for the construction of a new transmission line on a portion of the county highways to connect with its present system. A similar franchise providing for the construction of a distributing system in connection with new transmission line has also been approved.

THE INTERMOUNTAIN DISTRICT

LOGAN CITY, UTAH.—The Cache Valley Electric Company has added a motor repair department to its business.

PROVO, UTAH.—Plans are being considered by the Knight Woolen Mills for rebuilding the local plant, recently destroyed by fire, causing a loss of about $350,000.

STERLING, COL.—The Colorado Power Company is reported to be considering the construction of a large steam-driven electric power plant, to cost about $150,000, on a site recently acquired in Sterling.

HELENA, MONT.—The State Supply Company is wiring in conduit the new brick and concrete building of the Y. W. C. A. in this city. About 200 lighting outlets, 85 switches and 18 base receptacles are being provided. The wiring contract amounts to $2000. The fixtures to be installed will cost approximately $1700 additional.

HELENA, MONT.—The Helena Electric Company has a contract for wiring for light and power the new state laboratory building, amounting to $2,000. Several motors will be required. The building and equipment will cost $40,000.

DENVER, COL.—Bids will be received by the United States Reclamation Service, Denver, until October 1st for furnishing a 5000-kw. vertical hydraulic turbine and generator. For particulars address the United States Reclamation Service, Washington, D. C., or Denver, Col.

LIBBY, MONT.—Extensive improvements are contemplated by the Lukens-Hazel Mining Company, involving an expenditure of about $150,000, which will include the construction of a hydro-electric power plant, installation of mining machinery and a concentrating plant.

TOSTIN, MONT.—At Tostin the ranchers are taking steps to develop a plan of pumping water for irrigating about 6000 acres of land. It is proposed to install a pumping plant on the Missouri river, from which a lift of 100 feet will be required to deliver water into irrigating ditches.

HELENA, MONT.—Economy Mines Company, operating a mine in Mitchell gulch, 7 miles from East Helena, Mont., has installed electrical equipment, consisting of two 275,-h.p. motors for driving two air compressors, and one similar motor gear-connected to a 400-gallon mine pump which is required to make a 300-foot lift. This company is building a concentrating mill at the mine which is to be operated by electric power. The Montana Power Company furnishes the electricity. In the same locality the Montana-Chicago Mining Company is having a 4½-mile power line extended to its mine to enable it to use central station power.

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